

# Financial Inclusion And Growth Of Banking Sector In India

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## Abstract

*Financial inclusion promotes thrift and develops culture of saving, improves access to credit both entrepreneurial and personal emergency and also enables efficient payment mechanism. For achieving growth of business banks have to take on the role of an advisor for poor and disadvantaged as the right advice at a difficult time can go a long way. In order to expand the credit and financial services to the wider sections of the population, a wide network of financial institutions has been established over the years in India. Banks should give wide publicity to the facility of no frills account. With the help of technology banking products can get access in remote areas also. ATMs cash dispensing machines can be modified suitably to make them user friendly for people who are illiterate, less educated or do not know English. The involvement of Self Help Groups and Micro Finance Institutions is also must for development of effective financial inclusion models by commercial banks. Recently, the RBI Governor Raghuram Rajan outlined, in conceptual terms, what inclusion should be. "Simplicity and reliability in financial inclusion in India, though not a cure all, can be a way of liberating the poor from dependence on indifferently delivered public services and from venal politicians," Thus, the objective of Financial Inclusion is to extend financial services to the large hitherto un-served population of the country to unlock its growth potential. In addition, it strives towards a more inclusive growth by making financing available to the poor in particular.*

## 1. INTRODUCTION

Financial inclusion has become one of the most critical aspects in the context of inclusive growth and development. Financial inclusion is the process of ensuring access to appropriate financial products and services needed by vulnerable groups such as weaker sections and low-income groups at an affordable cost in a fair and transparent manner by mainstream institutional players. Banking sector plays considerable role in bringing financially excluded people in to formal financial sector. This will help to serve dual purpose i.e. financial inclusion as well as growth of the banking business of the country. Traditionally, it has been understood to mean opening new bank branches in rural and unbanked areas. Nowadays, however, financial inclusion is seen to be something more than opening bank branches in unbanked areas to take formal financial services across the length and breadth of the country.

This article makes an attempt to study financial inclusion along with the growth of the banking sector in India. It is studied on the basis data available from the Department of Financial services, Ministry of Finance, Govt. of India.

### 1.1 Meaning Of Financial Inclusion

Recently, the RBI Governor Raghuram Rajan outlined, in conceptual terms, what inclusion should be. "Simplicity and reliability in financial inclusion in India, though not a cure all, can be a way of liberating the poor from dependence on indifferently delivered public services and from venal politicians," he said. Further, "in order to draw in the poor, the products should address their needs — a safe place to save, a reliable way to send and receive money, a quick way to borrow in times of need or to escape the clutches of the money lender, easy to understand life and health insurance and an avenue to engage in savings for the old age."<sup>1</sup> Financial inclusion is delivery of banking services at an affordable cost ('no frills' accounts,) to the vast sections of disadvantaged and low income group. Unrestrained access to public goods and services is the sine qua none of an open and efficient society. As banking services are in the nature of public good, it is essential that availability of banking and payment services to the entire population without discrimination is the prime objective of the public policy.

### 1.2 RBI's Policy on 'Financial Inclusion'

- **No-Frills' Account :**

In the Mid Term Review of the Policy (2005-06), RBI exhorted the banks, with a view to achieving greater financial inclusion, to make available a basic banking 'no frills' account either with 'NIL' or very minimum balances as well as charges that would make such accounts accessible to vast sections of the population. The nature and number of transactions in such accounts would be restricted and made known to customers in advance in a transparent manner.

- **'Simplification of 'Know Your Customer (KYC)' Norms :**

Banks are required to provide a choice of a 'no frills account' where the minimum balance is nil or very small but having restrictions on number of withdrawals, etc., to facilitate easy access to bank accounts.

Further, in order to ensure that persons belonging to low income group both in urban and rural areas do not face difficulty in opening the bank accounts due to the procedural hassles, the 'KYC' procedure for opening accounts for those persons who intend to keep balances not exceeding rupees fifty thousand (Rs. 50,000/-) in all their accounts taken together and the total credit in all the accounts taken together is not expected to exceed rupees one lakh (Rs. 1,00,000/-) in a year has been simplified to enable those belonging to low income groups without documents of identity and proof of residence to open banks accounts.

- **Ensuring reasonableness of bank charges :**

In order to ensure fair practices in banking services, the RBI has issued instructions to banks making it obligatory for them to display and continue to keep updated, in their offices/branches as also in their website, the details of various services charges in a format prescribed by it. The Reserve Bank has also decided to place details relating to service charges of individual banks for the most common services in its website

Thus, the objective of Financial Inclusion is to extend financial services to the large hitherto un-served population of the country to unlock its growth potential.

The Indian households can be broadly divided in to two main groups, rural and urban. To have effective financial inclusion, the banks have to always keep in mind these target-groups and bring them to banking fold in such a way that it is a win- win situation for both. Banks can step in to augment financial inclusion in two ways (i) providing banking and other related services and (ii) providing non-banking services and support.

Financial inclusion promotes thrift and develops culture of saving, improves access to credit both entrepreneurial and personal emergency and also enables efficient payment mechanism. The banks have to take on the role of an advisor for poor and disadvantaged as the right advice at a difficult time can go a long way. This approach recognizes the close two-way links between poverty and deprivation on the one hand and being unable to find and use appropriate financial products and services on the other. In addition, it strives towards a development of banking sector in general and more inclusive growth by making financing available to the poor in particular.

## 2. FINANCIAL INCLUSION AND GROWTH OF BANKING SECTOR IN INDIA

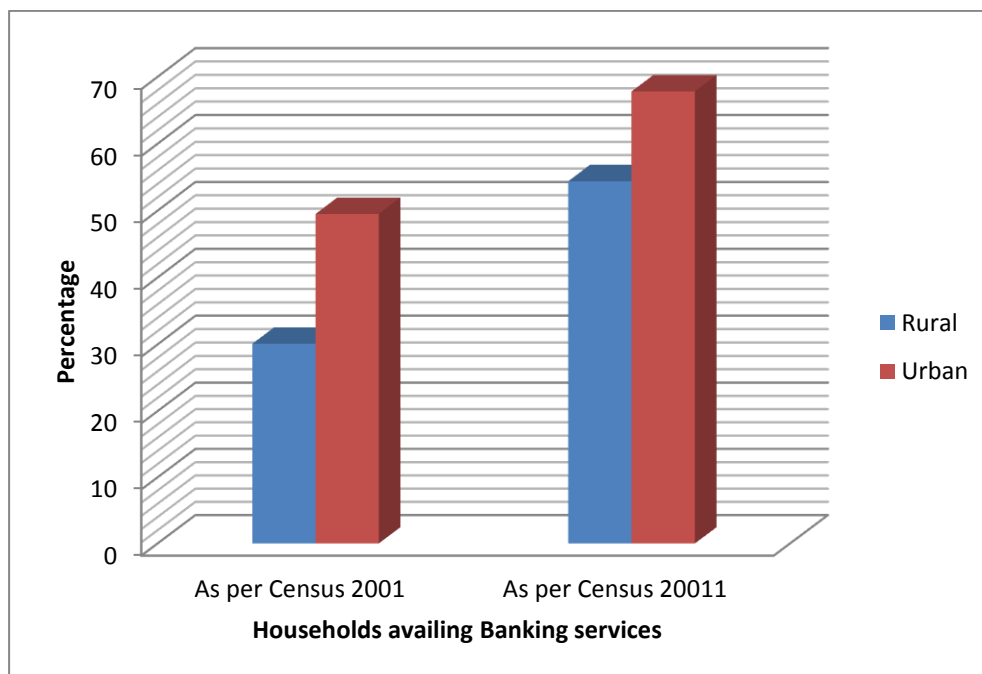
The banking industry has shown tremendous growth in volume and complexity during the last decade which indirectly supported to the movement of financial inclusion in both rural as well as urban areas.

**Table -1: Comparative statement of number of households availing banking services as per Census 2001 & 2011.**

Households	As per Census 2001			As per Census 2011		
	Total number of households	Number of households availing banking services	Percent	Total number of households	Number of households availing banking services	Percent

<b>Rural</b>	138,271,559	41,639,949	30.1	167,826,730	91,369,805	54.4
<b>Urban</b>	53,692,376	26,590,693	49.5	78,865,937	53,444,983	67.8
<b>Total</b>	191,963,935	68,230,642	35.5	246,692,667	144,814,788	58.7

Source: Department of Financial services, Ministry of Finance, Govt. of India.



**Figure 1: Households Availing Banking Services**

The table :1 shows that the number of households availing banking services in a country as per census 2001 & 2011, it clearly states that as per census 2001 in the rural households availing banking services were 30.1% compared with total number of households while it has increased to 54.4% as per the census 2011 compared with total number of households. In case of urban households availing banking services has registered growth from 49.5% to 67.8 % compared with total number of households as per census 2001 & 2011. Total rural & urban households

availing banking services has increased by 23.2% when compared with total number of households as per census 2001 & 2011.

(i) Expansion of Bank Branch network:

The number of functioning branches of public sector banks & Scheduled Commercial Banks (SCBs) in a country provides an opportunity for the people of that country to participate in the formal financial system and to utilize financial services of formal financial system.

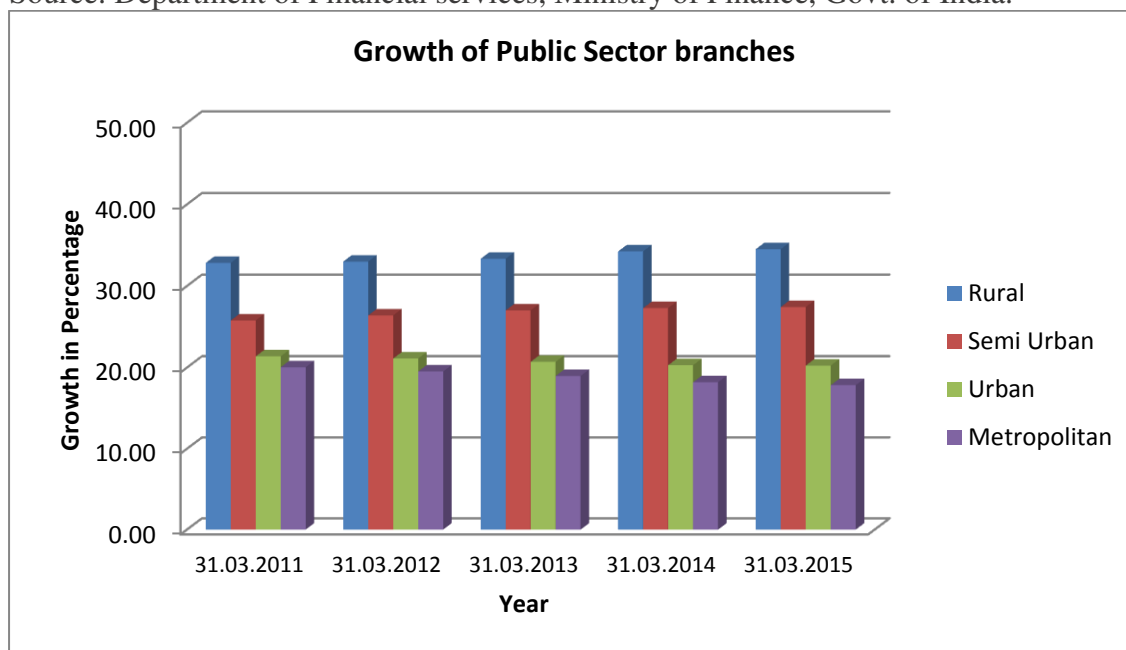
**Table - 2: Number of functioning branches of Public Sector Banks - Population Group wise**

As on	Rural		Semi Urban		Urban		Metropolitan		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
31.03.2011	20658	32.82	16217	25.77	13450	21.37	12612	20.04	62937	100
31.03.2012	22379	32.98	17905	26.39	14322	21.11	13244	19.52	67850	100



31.03.2013	24243	33.33	19642	27.00	15055	20.70	13797	18.97	72737	100
31.03.2014	27547	34.24	21952	27.28	16319	20.28	14644	18.20	80462	100
31.03.2015	29634	34.50	23549	27.42	17387	20.24	15325	17.84	85895	100

Source: Department of Financial services, Ministry of Finance, Govt. of India.



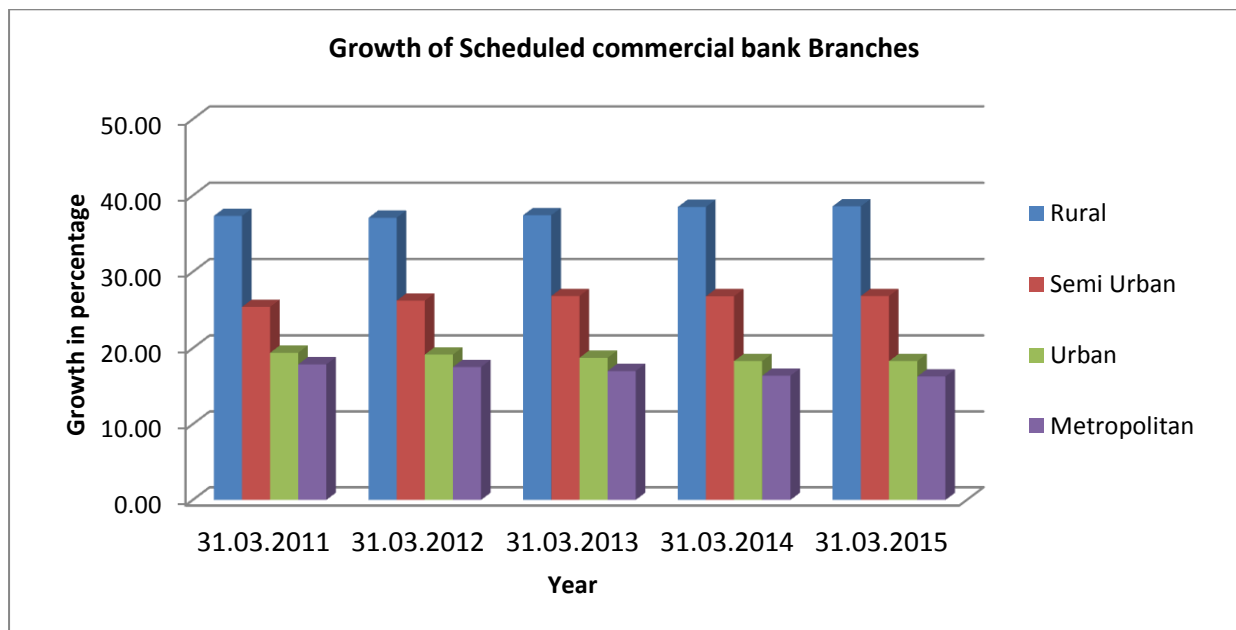
**Figure 2: Growth of public sector branches**

Above Table-2 indicates that there is continuous increase in number of functioning branches of Public sector banks. It clearly shows that number of functioning branches of Public sector banks in rural & semi urban has increased more when compared with other areas i.e. urban & metropolitan. There is consistent growth in number of functioning branches of Public sector banks during the study period it was 32.82% of the total functioning branches of Public sector banks in the year ending on 31.03.2011 and the percentage increased to 34.50% in the year ending on 31.03.2015. In the semi urban areas, it has recorded increase in percentage of functioning branches of Public sector banks from 25.77% to 27.42% in the year ending on 31.03.2011 & 31.03.2015 respectively. While in urban & metropolitan, it shows decrease in percentage of share in total of functioning branches of Public sector banks from 21.37% to 20.24% and 20.04% to 17.84% respectively during the study period.

**Table - 3: Population Group wise number of branches of Scheduled Commercial Banks (SCBs):**

As on	Rural		Semi Urban		Urban		Metropolitan		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
31.03.2011	33923	37.32	23089	25.40	17629	19.39	16255	17.88	90896	100
31.03.2012	36546	37.09	25834	26.22	18879	19.16	17274	17.53	98533	100
31.03.2013	39816	37.42	28546	26.83	19935	18.74	18092	17.01	106389	100
31.03.2014	45293	38.50	31530	26.80	21532	18.30	19275	16.39	117630	100
31.03.2015	48557	38.58	33766	26.83	23036	18.30	20498	16.29	125857	100

Source: Department of Financial services, Ministry of Finance, Govt. of India.



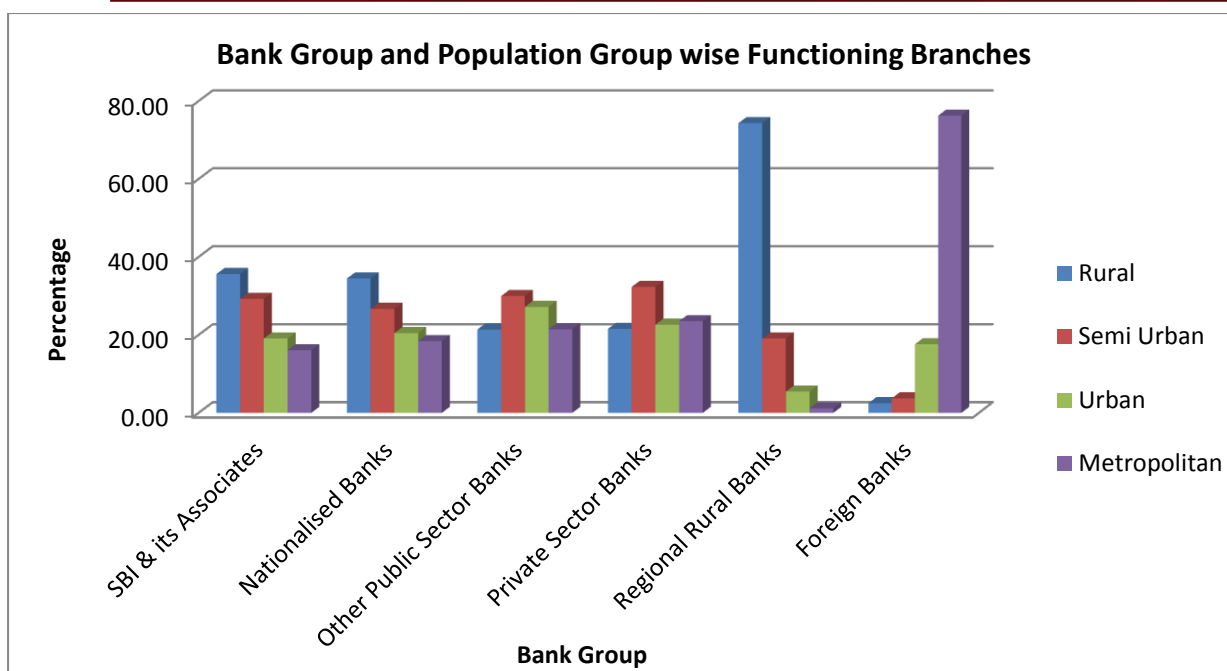
**Figure 3: Growth of Scheduled commercial bank Branches**

From the Table 3, it can be seen that branch expansion of scheduled commercial bank during the period of five years i.e. 2011 to 2015. Branches of Scheduled Commercial Banks in percentage to total branches of Scheduled Commercial Banks in rural area depict continuous increase except the year ending on 31.3.2012. As like rural area, the percentage of branches of scheduled commercial banks in semi urban area display consistent increase in it except the year ending on 31.3.2014 which shows slight decrease in percentage. While the percentage of branches of scheduled commercial banks in urban & metropolitan cities records consistent decrease during the study period.

**Table - 4: Bank Group and Population Group wise Number of Functioning Branches and percentage to total as on March 31, 2015**

Bank Group	Rural		Semi Urban		Urban		Metropolitan		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
SBI & its Associates	8029	35.61	6593	29.24	4304	19.09	3622	16.06	22548	100
Nationalised Banks	21228	34.47	16428	26.68	12604	20.47	11325	18.39	61585	100
Other Public Sector Banks	377	21.40	528	29.97	479	27.19	378	21.45	1762	100
Private Sector Banks	4302	21.53	6457	32.32	4521	22.63	4698	23.52	19978	100
Foreign Banks	8	2.47	12	3.70	57	17.59	247	76.23	324	100
Regional Rural Banks	14613	74.33	3748	19.06	1071	5.45	228	1.16	19660	100

Source: Department of Financial services, Ministry of Finance, Govt. of India.



**Figure 4: Bank Group and Population Group wise Functioning Branches**

Table 4, explains the contribution of bank group in particular population group in number & percentage as well. It can be seen that SBI & its associates and nationalized banks are more active in rural & semi urban area. The percentage of branches is less in urban & metropolitan cities when compared with total percentage of functioning branches. The percentage of branches of other public sector & private sector banks shows that they have concentrated more on semi urban areas when compared with other areas. Regional rural bank have focused more on rural population i.e. 74.33% while the foreign bank has more than 75% of branches in metropolitan cities.

### 3. CONCLUSION

Financial inclusion is the process of ensuring access to appropriate financial products and services needed by vulnerable groups such as weaker sections and low-income groups at an affordable cost in a fair and transparent manner by mainstream institutional players. The banks have to take on the role of an advisor for poor and disadvantaged as the right advice at a difficult time can go a long way. From the above study, it can be concluded that the contribution of Public sector banks in financial inclusion is consistently growing more specific in rural & semi urban area to utilize financial services of formal financial system. The study exhibit that the number of branches opened in rural area is more compared with other areas, while expansion of branches of scheduled commercial bank in metropolitan cities is comparatively less. Thus, it explains the role played by banking industry in financial inclusion in India which commensurate with the growth of banking sector in the country.

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# The Analytical Study For Identifying The Role Of Food In Developing New Ideas And Fusions Recipes By Indians And Chinese In The Country Of Singapore

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KeyWords	Tourism, Food, Fusion, Chinese, Indian, Singapore, Cuisine, Culinary Exchange				

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## Abstract

Tourism is a major part of the contemporary experience economy, in which food plays an important role. Food is a key part of all cultures, a major element of global intangible heritage and an increasingly important attraction for tourists. The linkages between food and tourism also provide a platform for local economic development, whenever the cultural interaction is taking place food and eating habits act as the mediator. The cultural exchange also increases possibility of culinary exchange; over the years it is proven again and again that a human being tries to accommodate his own eating habits and choices with the availability of the region and the specialties of those region and religion he is residing in. Comfort food is every human beings choice and right but when one settle away from his/her home or country it becomes difficult for them to adjust or acquire the eating habits of the native culture or people. Hence it always works in fever with the settlers that they try to store the necessary ingredients and find substitutes for other necessary but UN storable ingredients. Singapore is a developed but a manmade nation, it comprises of many cultures and many religions but native to same nation. Singapore

*try to accommodate the peace loving heritage habits .many Indians have settled in Singapore along with original Chinese residents and now they have become 100 % Singaporean but some of their eating habits still goes in theirs roots to India for e.g. a person running a food stall in one of the renowned market place food courts mixed Indian traditional tempering with Schezwan style noodles and tries to make the Schezwan sauce with Indian Kashmiri chilies instead of small Thai red chilies. This paper will help to understand that the fusion recipes sometimes are appreciated which may get created accidentally, sometimes forcefully and even some times necessary.*

## 1. INTRODUCTION

A cuisine is a style of cooking known by the distinctive ingredients used, cooking equipment's, techniques and daily and festive dishes made. Cuisine has always been associated with the culture and the geography of the region. Religious food laws have a strong influence on the cuisine namely Hindu, Islamic and Jewish. A particular region is known for its traditional regional recipes, the customs and availability of the ingredients combine to make these unique dishes.

There are various factors that have an effect on the eating habits or also could be mentioned as the geographical influence on a particular regions cuisine:

**Climate:** It determines the native foods that are available in the region during the season or what could be more suitable as a diet pertaining the region. Climate also plays a major role where climatic conditions affect the fuel availability and hence need to adapt a cooking technique which would cook faster. Climate has been a major reason in adaption of various cooking techniques and styles. Foods preserved for winter consumption by smoking, curing, and pickling have remained significant in world cuisines

**Economic conditions:** It can affect the trade, distribution of food a cuisine is majorly influenced by the availability of ingredients through trade Religious laws: restrictions/laws pertaining to eating habits or consumption of meat. Culinary Tourism is not related only to travelling but can be found in the domestic market also.

Food is an integral part of all cultures, a major part of global heritage and very important for a tourist as it is a matter of survival. Tourism has lot of potential for local economic development and food can become a novelty experience. Food and tourism benefit with each other which help in promoting of the tourist destination. The eating experience provides people with a distinctive way of communication, where exchange of cultures and cuisines takes place. Culinary tourism also leads to heavy commercial profits increasing the value of a tourism destination. Food and drink are the most overlooked components of the visitor's experiences. Travelers are not at their own home so to fulfill the basic needs of food, he or she is bound to eat out during travelling which automatically creates opportunities for new entrepreneurship development or careers which are a primary form of Culinary Tourism and this behavior is sometimes overlooked because we take eating as a normal and regular behavior.

Culinary Tourism is an important new industry that weds two related but distant forms of hospitality food services and tourism. Hospitality business has an enormous under explored opportunity to make a significant impression on visitors with unique and memorable eating and drinking experiences. So food can be treated as both destination and means of tourism. Culinary Tourism can be experienced in any way or form of food, tasting, preparation, consumption, presentation, etc. Cooking methods, cultures, form of eating habits. Are all ways of tourism exploring and experiencing Culinary Tourism.

Fusion cooking can be defined as a combination of various forms of cooking which means different cuisines can be combined to make one meal experience or preparation of a dish with a cooking style that is native to a different region or use of certain spices or blends that is not a part of that cuisine. Pizza for example is a product native to Italy but made all over the world with the available equipment's ingredients and the taste that would be savored by the region, another example would be the adaptation of Chinese cuisine by the world that would suit their palate. Travelers or Tourists have been a major cause for this fusion change as a matter of their survival. Chefs have adapted themselves to this change and work towards the advancement of the fusion cuisine. A Chef would always serve that would be liked by his guest maintaining as much authenticity probably possible.

Singaporean cuisine owes its origination to the Malaysian cuisine, it is highly influenced by the Indonesian, Indian, and predominantly Chinese, and the other subtle influences can be from other areas as Middle East, Thailand and Sri Lanka. Variety of influences on this cuisine is the impact of globalization

This globalization phenomenon on this cuisine found at various outlets and food courts, examples include Lau Pa Sat and Newton Food Centre, rather than Fine dining or regular restaurants. The reason being the food stall or hawker stalls which include a variety of foods from India, Korea, Japanese Thailand Vietnam. These hawker centers are enough in number, serving at a cheap rate and holds a large customer base

Another example that can be stated from the chef's point of view is that a Chinese chef can use Indian spice or spice blends or ingredients core to the country creating a fusion or an Indian chef replicating a Fried Noodle or a Manchurian dish

Adaptation of a cuisine or a food is the need to suit the dietary needs with the help of local produce in the region. An historical context to this is the early southern Chinese immigrants (Hokkien, Teochew, Cantonese, Hakka and Hainanese) who produced food with the available ingredients and cannot be termed as authentic Chinese Singaporean Chinese cuisine is largely based on the cuisines of the Hokkien, Teochew, Hainanese, Cantonese, and Hakka dialect groups which comprise mainly of Chinese population in Singapore.

## **2. OBJECTIVES**

- I. To understand the concept of parallel existence of Indian and Chinese cuisine in Singapore.
- II. To analyze the food fusion between Indian and Chinese eating habits.

- III. To find factors that affects the authenticity of Indian or Chinese cuisine.
- IV. To find the contribution of Chinese and Indian Residents towards the development of Fusion cuisine of Singapore.

### 3. CONCEPTS

#### ➤ Indian Singaporean Cuisine

Indian Singaporean cuisine relates to the food prepared and established in Singapore that are derived majorly from the Asian culinary traditions. The great variety of Singapore food includes Indian food, with a major influence of Tamil cuisine and chiefly Tamil Muslim specialties, it is also found that North Indian food is gaining its popularity in the region. Indian dishes are modified to different stages, with a continual influence of Singapore culture, ingredients available locally, climatic conditions and eating habits. These cuisine modifications bought in a variety of dishes. A few examples to quote would be: Mee goreng, yellow egg noodles stir fried with ghee, tomato sauce, some chili, egg, vegetables, and various meats and seafood may be added

Vegetable Pickle - Indian pickle.

Nasi biryani - A Popular Indian Muslim dish of saffron rice and meat, sold at Indian and Malay restaurants and a must have dish at Malay weddings

Curry – Indian Curry Veg / Non Veg a traditional dish can be found in Chinese as Chili crab, Laksa in Singapore

#### i.) Chinese Singaporean Cuisine

Singapore Chinese cuisine is an adaptation of the Malay cuisine and has a wide influence of southern Chinese cuisine as well as Indonesian cuisines. The country of Singapore is basically a modern civilization have a major impact of Chinese culture as they were the original founders of this civilization, later on, various cultures settled down and prospered in Singapore, as a result Chinese Cuisine carries a major influence on the food culture of Singapore.

#### Examples:

Kari lemak ayam, a Peranakan chicken curry with a coconut milk

Sambal kangkong, a dish of leafy green vegetables (water spinach) fried in sambal

Satay bee hoon, thin rice vermicelli served with spicy peanut sauce

Dimsums and Chicken and Rice an origin of Chinese cuisine has a distinct place in the Singaporean cuisine.

#### ii.) Fusion Cuisine

Fusion cuisine is cuisine that combines elements of different culinary traditions. Cuisines of this type are not categorized according to any one particular cuisine style and have played a part in innovations of many contemporary restaurant cuisines since the 1970s

#### Examples

Singapore Stir Fried Rice, Chinese Bhel, Szechwan pan cakes, Jalfrezi Chicken, Chow mein, Gobi Manchurian



#### 4. METHODOLOGY USED

- **Data Collection:** Primary data is collected through Feedbacks, Questionnaires, and in person and e- interviews.
- **Sampling Techniques:** This topic of research is associated with Indian and Chinese resident as well as tourists in Singapore who experience the fusion cuisine of Singapore and hence RANDOM SAMPLING technique has been adopted
- **Sample Size:** 40 Questionnaires were circulated to the population and the feedback analysis for the same is done to support the objectives of this research paper.
- **Population:** Educated, culinary students, self-employed people who gave their valuable feedback on the topic
- **Scope:** The research paper is a study of “The role of Indian and Chinese Residents in Singapore, towards developing of the new fusion cuisine of Singapore”

#### 5. LITERATURE REVIEW

- The rhetoric of Lao/French fusion: beyond the representation of the Western tourist experience of cuisine in the world heritage city of Luang Prabang, Laos Staiff, Russell<sup>1</sup>, Bushell, Robyn<sup>1</sup> Source: Journal of Heritage Tourism. 2013, Vol. 8 Issue 2/3, p133-144. 12p.  
This article explores the intersections between the way the cuisine is represented, the contestations around these representations (what is included and excluded, the use of the past) and the Western cuisine experience of Luang Prabang
- When worlds collide -Bowling, Danielle Source: Hospitality (1036644X). Jul2015, Issue 716, p12-15. 3p.  
The article informs about efforts of Australian chefs and diners to redefine Asian cuisine and to offer fusion-based menus. Topics discussed include mix of south-east Asian flavours of Thai, Vietnamese and Malaysian cuisine offered at Sugarcane restaurant, Asian fusion menu of Darlings Supper Club restaurant which includes dessert dumpling and coconut creme brulee with pineapple gel, and views of chef Leigh Power, Sugarcane's owner Milan Strbac and Darlings' co-director Sam Astbury on the same.
- The changing nature of the relationship between cuisine and tourism in Australia and New Zealand: from fusion cuisine to food networks. Authors: Hall, Michael Mitchell, Richard  
The chapter argues that tourism has been a key component in the changes in Australian and New Zealand cuisine from both a demand and a supply perspective and examines the manner in which cuisine has now become a central component of the Australian and New Zealand tourism experience.
- Menu Strategies: Hello Delhi [Fusion Indian Cuisine]. Authors: Disbrowe, Paula Source: Restaurant Business. Jun 15 1998, Vol. 97 Issue 12, p88. ISSN: 0097-8043 Accession Number: LRTI14399366

As boundaries between traditional cuisines continue to blur; a new breed of Indian cuisine becomes the hottest player on the fusion front.

- v.) Restaurant notes: New food truck will feature Vietnamese, Asian-fusion cuisine  
 Authors: Larson, Cindy Source: News-Sentinel, The (Fort Wayne, IN). 09/30/2014. Accession Number: 2W61295266295 Database: Newspaper Source Plus  
 I've been following progress on a proposed food truck business for what seems like a couple years now on Facebook. Vietnummy (go to Facebook and search on Vietnummy) will be the name of a food truck featuring Asian-fusion and Vietnamese food, such as Vietnamese tacos and Banh M.
- vi.) New fusion cuisine flourishes in Baja California Authors: OMAR MILLAN - Associated Press Source: AP English Worldstream - English. 11/04/2012. Accession Number: 3e6d1fe89ca4480bbf65c2eb31115  
 Document Type: Article  
 TIJUANA, Mexico (AP) Until recently, Baja California's culinary contribution to the world amounted to the Caesar salad, a dish hardly associated with Mexican food. Beyond that, this long, thin peninsula was known more for its Chinese food and pizza thanks to the thousands of migrants from all over the world who began to settle the Mexican state south of California in the 19th century. Now a group of chefs wants to change that, working to create a unique cuisine largely based on fresh seafood caught in the seas flanking Baja and the produce from its fertile valley.
- vii.) Fusion dishes up modern 'honest' Kiwi cuisine, Source: Timaru Herald, The. 08/21/2012, p06. Document Type: Article ISSN: 1170-0920 Accession Number: THL1208210006156004356-CM  
 Database: Newspaper Source Plus  
 Lindsay and his exceptional team offer South Canterbury diners a range of outstanding seasonal food that celebrates the bountiful harvests of the region, in simple elegant style, for patrons as they drink in the magnificent views across the bay to the Southern Alps.  
 At Fusion the focus is on modern, 'honest' New Zealand cuisine, with a blend of New Zealand products and added international flavors.
- viii.) Fusion Evolution, Authors: Lowe, Kimberly D. Source: Restaurants & Institutions. May 15 1998, Vol. 108 Issue 13 , p36. 20. Document Type: Article 0273-5520 Accession Number: 667058  
 This article states the impact of fusion cuisine on the United States, highlighting the opening of the Asia de Cuba restaurant in New York in November, 1997. It also states the details on the restaurant menu; Enthusiasm of fusion cooks; Comments from Arnold Eric Wong, chef-owner of Eos restaurant; Forecasts on the future of fusion cuisine.

- ix.) Asian fusion cuisine rolls in at Umi Star: A new restaurant which blends different styles of traditional Asian **cuisine** with Southwestern and Southern California influences which is to open on North Campbell Avenue. The concept of the restaurant, located in the Campbell Avenue Shops, just north of East Grant Road, is to serve "a little bit of Asian street food with their own take on it," said owner Jason Anderson. Umi Star (Umi means "sea" in Japanese) will feature unique dishes, including Japanese ceviche and hot dogs, in addition to a selection of street tacos, nigiri, sashimi and sushi rolls
- x.) World cuisine is the New Fusion, Authors: Smith, Brooke Source: Chef Magazine. Mar2011, Vol. 55 Issue 3, p6-6. 2/3p. Document Type: Opinion HARA, Marcia OBAMA, Michelle, 1964- 1087-061X Accession Number: 60010255  
In this article the author discusses the use of the other countries' cooking style to enhance and balance the Japanese-American dishes of Marcia Hara, an executive chef at Illahe Hills Country Club in Salem, Oregon. The owner shares various countries' cooking style with an intention to enhance the ingredients and flavors of her preparations. She also stresses on the importance of eating fresh foods as one method to promote the national campaign against obesity by U.S. First Lady Michelle Obama.
- xi.) An uncompromising take of South Chinese Cuisine, Source: Daily Financial Times. 11/08/2014. Document Type: Article  
Over the years, Sri Lanka has developed its own taste brand of hybrid Chinese cuisine that caters to the taste appeal of the masses. While this form of fusion cuisine has been liked by many, purists will argue that using popular Sri Lankan spices and techniques to create traditional Chinese dishes will affect the authenticity of the traditional dishes. Some of the favorite fusion dishes are as follows:  
Local favorites like pepper fried beef and chilli chicken Lobster with cheese and butter sauce and garoupa stewed with pickled cabbage. Mixed seafood braised with rice noodles in casserole was a warm introduction to the restaurant's identity. The lack of spice was jarring at first but the subtleties of the traditional spices that are incorporated in the dish helped define its unique taste. The green peppers and prawns truly brought the dish to life, although those elements seemed lost in the unnecessarily generous serving of noodles.

## 6. DATA ANALYSIS

- I. 69.4 % Males and 30.5 % Females have contributed to the responses towards the topic
- II. A total of 33.3% Chinese and 66.66 % Indians have contributed towards the topic
- III. From the total Respondents 84.2% explore the local Singaporean cuisine
- IV. The following is the responses of the cuisine preferred by the respondents
 

Indian	42.1
Chinese	26.3

Indo Chinese 21.1

Other 10.5

- I. 67.9 % respondents enjoy twists or fusion of both cuisines while 32.1 do not.
- II. 89.5 % respondents enjoy Chinese cuisine and 10.5 enjoy Indian
- III. Following are the responses for common factors found in the Indian and Chinese Cuisine
  - a. Chinese cuisines has more variety like spicy, non-spicy, sweet, salty and sour Indian cuisines mainly with spices and some spicy
  - b. Chinese believe in retaining the color of food and creative presentations to a lesser importance in Indian food
  - c. Both of them have good business, as people from both sides are in Singapore...
  - d. Both the cuisines are aromatic
  - e. Indian cuisines- Fried(oily) hot & spicy, with coconut milk or without the milk, yellow ginger or ginger taste Chinese cuisines, variety of flavor and taste, use lots of garlic, usually steam fish, non-spicy.
  - f. Indian food too oily, vegetables overcooked but bread and rice is good Chinese food more varieties for non-veg and has exquisite dishes like shark's fin, abalone, and bird nests dessert.
  - g. A few dishes and ingredient in common are Curries in Indian and stews in Chinese use of chilies, use of onion and coconut as thickeners in Indian food and starches in form of corn flour being used in Chinese food
  - h. Both the cuisines have a few things in common, use of oil, blends of spices, use of vegetables along with meat, Spices
  - i. The cooking period for Indian food is more compared to Chinese food who believe in maintaining the freshness of the vegetables
- IV. The following is feedback on the various factors that affect the authenticity of Indian or Chinese cuisine
 

Availability of ingredients	57.9%
Palate of the consumer	26.3%
Influence of other cultures	31.6%
Popularity of the cuisine	36.8%
Convenience	42.1%
Likes and/or Dislikes of consumers	31.6%
Allergies and Health concerns	15.8%
Choice of Vegetarian/ Non vegetarian	57.9%
Religious and Regional influence	26.3 %
- V. 68.4% respondents believe that fusions or innovations are created due to need and 26.3% do not believe.
- VI. 89.5% respondents say that they play an important role for new fusion food to get established or popular compared to 10.5 % who do not believe in the same



Following is the opinion of respondents on the role played by people of Indian and Chinese origin in creating fusions in food in Singapore

- Fusion food can be created by anyone as long as one understands the peculiarity of each and merge them into something that is acceptable by both and palatable enough for even non-Chinese and non-Indians
- It's goods that a there is fusion of cuisine between Indian and Chinese because these are the biggest population in the world.
- Both were instrumental in getting their base food palette to Singapore and then few explored it and created a fusion.
- There is a lot of different fusion cooking involving a fusion of Chinese and Indian cooking in all the market corners of Singapore. When you taste the food you clearly know it's not the first time you taste something like it.
- Young people want to have change of food compared to the traditional food cooked by their parents. As traditional food sometimes take too long to prepare and also the ingredients are difficult to obtain or prepare so fusions food suits their taste bud.

## VII. Cultural Influence

- People always like to try something new
- As the people in Singapore has exposed to variety of food from various races not just only Indian and Chinese, thus, the acceptance of taste of fusions food by the people is important
- Personally should have no fusion. Authentic Indian food should not be modified.
- This is consumer driven market hence market has to be according to need of customers. If you don't want and cannot change then maybe you have to restrict to only those people who likes that food.
- There is not much scope of fusion in Singapore because people prefer Malay, Chinese, Thai, and Indian as authentic but they make mini samosas with Chinese vegetables moist stuffing which keeps its taste different from both the cuisines.
- Maximum population being Indian and Chinese that's why the proportion of fusions is more
- For example Indians took the paratha and Chinese likes the egg so they started selling egg paratha

## 7. CONCLUSION

The concept of parallel existence was proved with a response from 69.4 % Males and 30.5 % Females out of which, 33.3% Chinese and 66.66 % are Indians from the total Respondents and 84.2% explore the local Singaporean cuisine. The following is the responses of the cuisine preferred prove the impact of existence on both the cuisines over the respondents

Indian	42.1
Chinese	26.3
Indo Chinese	21.1
Other	10.5

As per the survey analysis Fusion food is enjoyed by 67.9% and 89.5 % respondents enjoy Chinese cuisine and 10.5 enjoy Indian. To state a few common factors in both the cuisines are cooking ingredients- oil, spice (chili, ginger, garlic), cooking methods- boiling, steaming, frying and maintaining the textures and consistency- curries and stews, flavors- sweet spicy salty and sour. The availability of ingredients and choice of vegetarian and non-vegetarian have a maximum impact over with 57.9% each, followed with convenience, at 42.1%, influence of cultures and likes or dislikes with 31.6 %, palate of the consumer, religious and regional influence at 26.3 % and allergies and health concerns at 15.8% are the various factors that affect the authenticity of both the cuisines. As both the countries are the biggest population in Singapore has an impact over the food culture and thus a fusion was created to suit the palate. The food made with the local available resources and ingredients does not always match to the traditional taste but would not taste bad, for example Indians took the paratha and Chinese likes the egg so they started selling egg paratha.

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# A Low-Cost Approach To Monitor Elderly Wellbeing On Embedded Platform

<b>Paper ID</b>	<b>IJIFR/V3/ E9/ 009</b>	<b>Page No.</b>	<b>3239-3247</b>	<b>Subject Area</b>	<b>Computer Engineering</b>
<b>KeyWords</b>	<b>Elderly Health, Rural Healthcare, Embedded Healthcare System, Remote Health Monitoring</b>				

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## Abstract

*This research work includes finding an answer for observing the elderly wellbeing. It can likewise be utilized as a part of provincial regions or remote ranges where legitimate doctor's facility offices are not present. The examination work is focused on setting up a minimal effort framework on implanted stage which can check the state of an elderly patient's body with a predefined set of parameters. A lot of this exploration is principally focused on building a close immaculate model with keeping the expense of the framework to be worked to the base. This framework will roll out a decent improvement in what individuals look like towards social insurance area. Keeping the cost least and building the framework to check the state of a human body continuously will pull in most to this straightforward and dependable framework to make utilization of. The present framework constructed will check through its different sensors the rate of heart beat, blood oxygen level, the temperature of the body in degree centigrade and the breath rate.*

## 1. INTRODUCTION

On the off chance that we consider the Indian present day society, the rate of the older folks is on the developing scale. The need of taking their consideration is in high need. Particularly, for those older folks who will live in the home alone without anybody's

guide. Numerous home frameworks are intended for this reason however they don't fill the sole need of observing the elderly wellbeing. In this developing period of innovation, it is in the high need to mix the innovation with the social insurance foundation to achieve everybody's requirement for it. Remote medicinal services are the main route conceivable to achieve the poor on time. Individuals living in the extremely remote territories of the province need minimum human services offices. On account of the crisis, in such remote spots, it is exceptionally troublesome for them to go after the therapeutic offices inopportune time. This study supports the requirement for the remote human services with which we can give the essential guide to the patients in the remote reaches at whatever point required.

## **2. LITERATURE SURVEY**

There are numerous other social insurance frameworks for observing the wellbeing state of a human body. The e-Health Sensor Shield V2.0 permits Arduino and Raspberry Pi clients to perform biometric and therapeutic applications where body observing is required by utilizing 10 distinct sensors. Be that as it may, the medicinal services framework which I am proposing here will be way less expensive contrasted with the frameworks which are now present in the business sector.

The proposed framework doesn't trade off on any of the functionalities contrasted with the current frameworks. Be that as it may, likewise the remembering the cost element it makes an extraordinary showing with regards to with its base sensors' setup.

## **3. MOTIVATION**

Another primary purpose of proposing the new model is the procurement of social insurance frameworks in the small-town territories of India. At the point when reviewed principle disadvantage with the rural medicinal services framework is the accessibility of specialists and a plentiful number of healing facilities. In this way, the rustic individuals of our nation are lingering behind to get appropriate restorative offices.

The way that numerous financial specialists are hoping to put their cash in the urban social protection framework is aptitude set obtained by the specialists there.

Considering urban medicinal services then again, the metropolitan urban areas have the accessibility of a sufficient number of specialists and healing facilities. Yet, only this can't make the point that the urban populace is getting the ideal treatment. The urban medicinal services base is giving the perfect arrangement, however, a quick one.

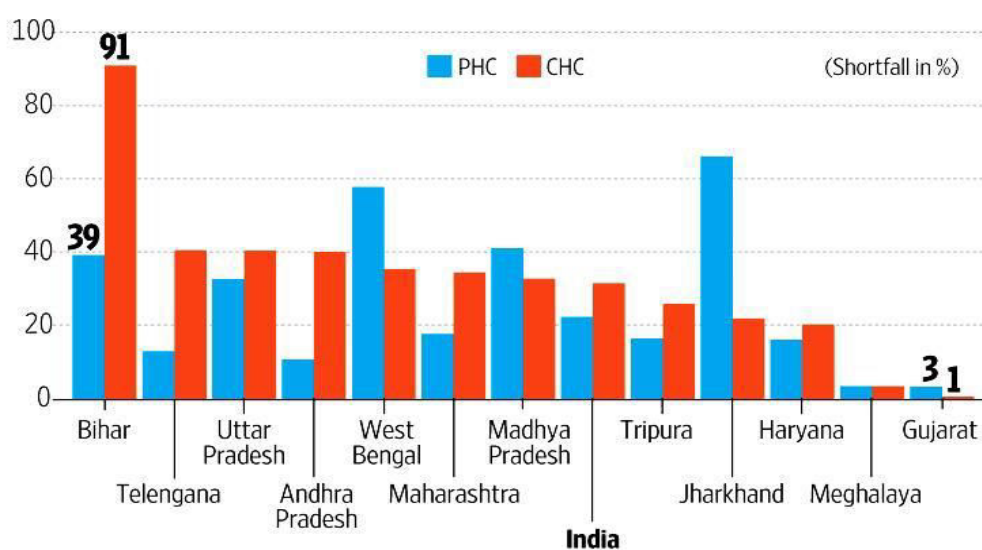
Moving towards building perfect answers for giving elderly human services checking framework in rustic ranges, there are a couple of critical objectives to be met remembering the present situation in nation's provincial territories. The expense is the main restriction. We need to consider a practical approach to take care of the issue with a close perfect arrangement. The second element is the execution of the framework. We couldn't overlook the execution criteria while keeping the expense to the base.



As per the World Bank out of an entire people of India, around 68% of the populace lives in the rustic locale. Alongside this, another stunning reality is that exclusive 35% of specialists in our nation are treating the country populace. Only this motivated me enough to begin this anticipate. Here in this anticipate I put my exertion in finding an answer for the issues confronting by country zones with respect to human services procurements. This minimal effort portable human services framework can give the essential levels of reports on the significant wellbeing angles.

## WEAKNESS AT THE START

Numbers are percentage shortfall in primary health centres (PHC) and community health centres (CHC) as on 31 March 2015



Source: Rural Health Statistics, 2015

**Figure 1: Rural Healthcare Statistics – India 2015**

As per the World Bank out of an entire people of India, around 68% of the populace lives in the rustic locale. Alongside this, another stunning reality is that exclusive 35% of specialists in our nation are treating the country populace. Only this motivated me enough to begin this anticipate. Here in this anticipate I put my exertion in finding an answer for the issues confronting by country zones with respect to human services procurements. This minimal effort portable human services framework can give the essential levels of reports on the significant wellbeing angles.

Figure1 shows the graphical representation of the statistics. The Graph is prepared comparing mainly two attributes. Primary Healthcare Centre (PHC) and Community Health Centres (CHC). Community Health Centre CHCs: Community Health Centres are available is basic health unit in the urban areas.

Primary Health Centres: The basic units with the most basic facilities, and especially serving rural India, generally at the level of a panchayat.

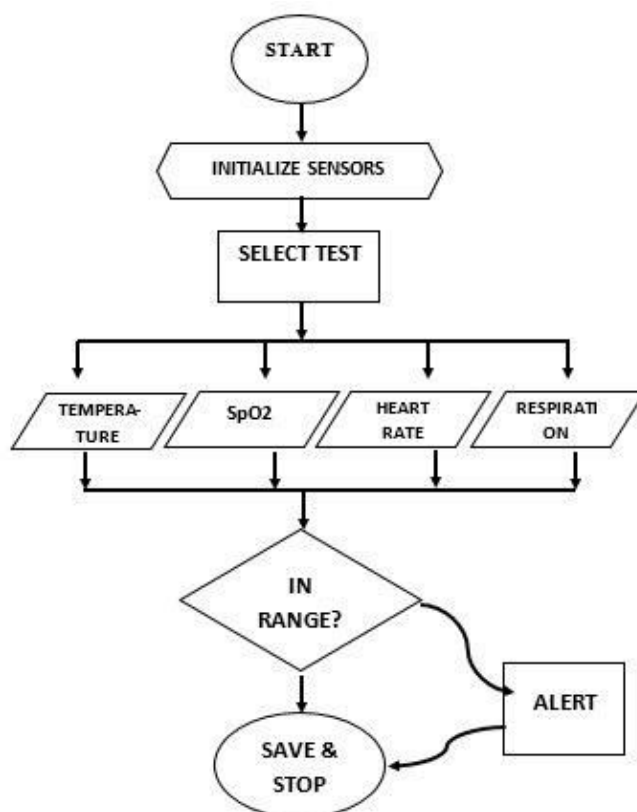
#### 4. PROBLEM STATEMENT

To set up a minimal effort and low power remote medicinal services unit which can screen the wellbeing condition and send the report to the concerned specialists.

#### 5. PROJECT OBJECTIVE

- To make utilization of sensors for removing the data like temperature, appraisal of blood vessel oxygen immersion, or SpO2, heart rate and breath rate in a human body
- Extract the qualities got from sensor onto a PC or a tablet.
- Using appropriate interfaces and programming to control and show the outcomes with a graphical client interface.
- Prepare alert module and send the alert warning to an individual group of specialists if the sensor values extracted from the patient body cross a threshold.

#### 6. SYSTEM DESCRIPTION



**Figure 2: System Control Flow**

The complete proposed framework depiction is as in figure 1. Every one of the sensors is instated in the first place before the test. Through a client interface, an arrangement of tests that can be taken will be shown on to the screen. A test at once is to be chosen out of four. Temperature test to distinguish the body temperature, heart rate test to identify the

heart rate every moment, SpO2 test to recognize the level of oxygen present in the body lastly the breath test which gives back the outcome as the number of times a man breathed in the oxygen.

Temperature test gives the outcome in 2-3seconds. All different tests are taken for a moment long to get the exact results with the varieties in the readings. An entire moment long of one-minute perusing will help the guardians or specialists to check the varieties in the readings and therefore foresee the genuine condition on their insight.

## 7. HARDWARE REQUIREMENTS

There are numerous equipment parts utilized as a part of building the model which incorporates a microcontroller board and sensors. The rundown of the board and sensors utilized as a part of the model are as given in the table underneath.

**Table 1: Hardware Components used**

	Component	Function
1	Arduino UNO R3	Microcontroller Board
2	LM-35	Temperature Sensor
3	Infrared and Photo Sensor	Blood Oxygen Level
		Heart beat rate
4	MX4115AP	Air – Flow sensor
		Respiration Rate
5	Nasal Prongs	To Get the flow of air from nose to sensor (MX4115AP)
6	HC-05	Bluetooth Module

## 8. HIGH LEVEL SYSTEM DESIGN

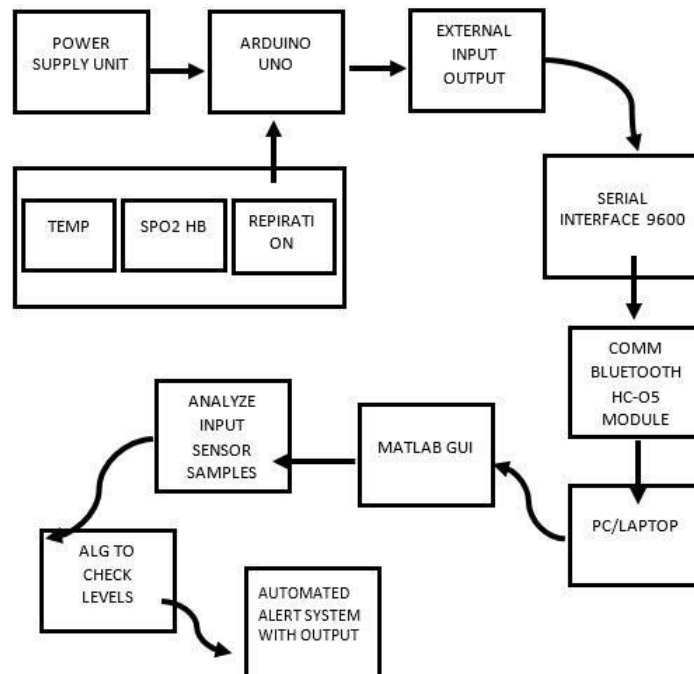
Figure2 gives the diagram of framework outline in short. A 5v power supply must be given to the microcontroller board. All the outer sensor segments' information is given to the board. The Arduino UNO R3 board controls the force supply to the sensors going from 1.5v to 5v. Correspondences between the segments in the setup are done on the serial interface.

The HC-05 Bluetooth module deals with a trade of information between the client interface and the setup. The client interface presently in this connection is given on a Bluetooth empowered PC or tablet.

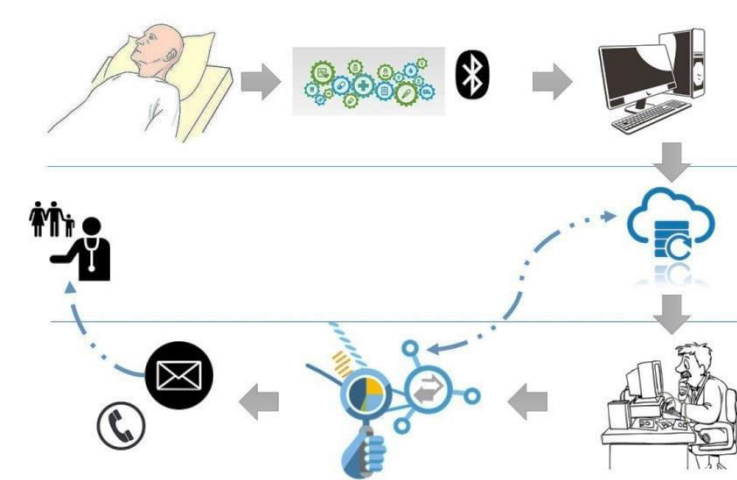
Sensor yields went on to the PC are gotten on the flip side and are examined in MATLAB stage. Each inspected is plotted on the diagram to break down the readings. Numerous calculations are set up to check the specimens. In the event that the levels of the yield tests from the sensors gave are inside the level of edge, they are dealt with as protected. In the event that any example or set of tests traverse the edge level, then that specific perusing is sent to the alert module.

The ready framework here will be an electronic mail module. This will be activated once the sensor yield qualities are over the typically predefined edge level. An email will

be sent to individual restorative commanding voices if there should arise an occurrence of the rustic situation and if there should arise an occurrence of elderly, to their family specialists. The alert email will contain the time and date alongside the readings from the sensors which have crossed the limit set.



**Figure 3: System Architecture**



**Figure 4: System Design**

## 9. RESULTS AND ANALYSIS

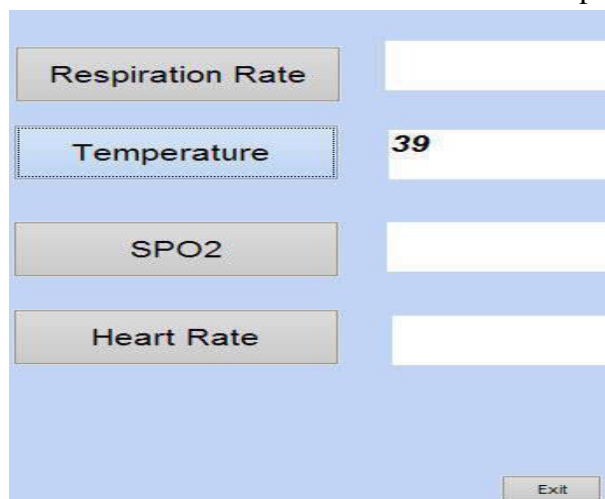
In this section, you will see the actual results after processing the samples from the various sensors.

### I. Temperature Module

- The LM-35 Temperature Sensor gives us the values in form of voltage, in mV.



- We can scale the output voltage to get the graphical representation.
- Scaling: 1 Degree change in temperature value outputs 10mV.
- Thus 1°C  $\square$  10mV.
- Read Temperature On Microcontroller – LM-35 is connected to pin A0.



**Figure 5: Temperature output in Degree celcius**

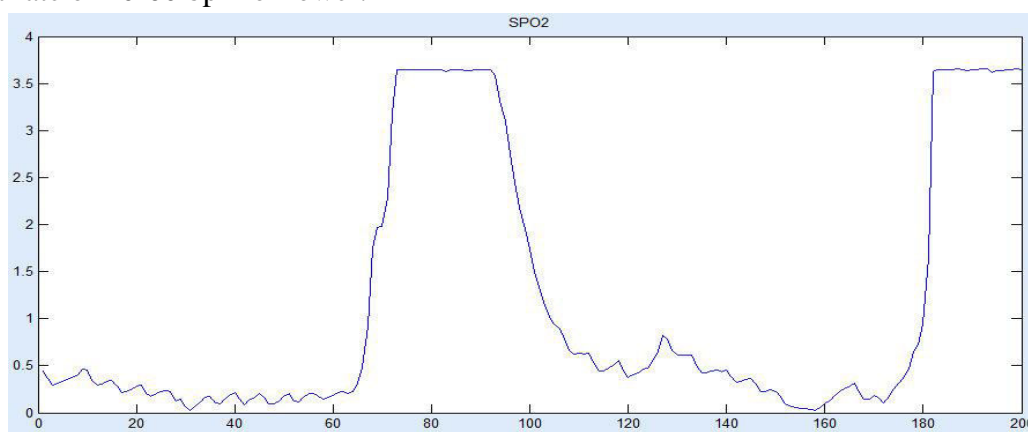
Normal body temperature can range from 97.8 degrees F (or Fahrenheit, equivalent to 36.5 degrees C, or Celsius) to 99 degrees F (37.2 degrees C) for a healthy adult.

## II. SpO2 and Heart Rate Modules

SpO2 stands for peripheral capillary oxygen saturation, an estimate of the amount of oxygen in the blood. More specifically, it is the percentage of oxygenated hemoglobin (hemoglobin containing oxygen) compared to the total amount of hemoglobin in the blood (oxygenated and non-oxygenated hemoglobin).

This value is represented by a percentage. If your Pulse Ox™ says 98%, this means that each red blood cell is made up of 98% oxygenated and 2% non-oxygenated hemoglobin. Normal SpO2 values vary between 95 and 100%.

Most adults have a resting heart rate of 60-100 beats per minute (bpm). The fitter you are, the lower your resting heart rate is likely to be. For example, athletes may have a resting heart rate of 40-60 bpm or lower.



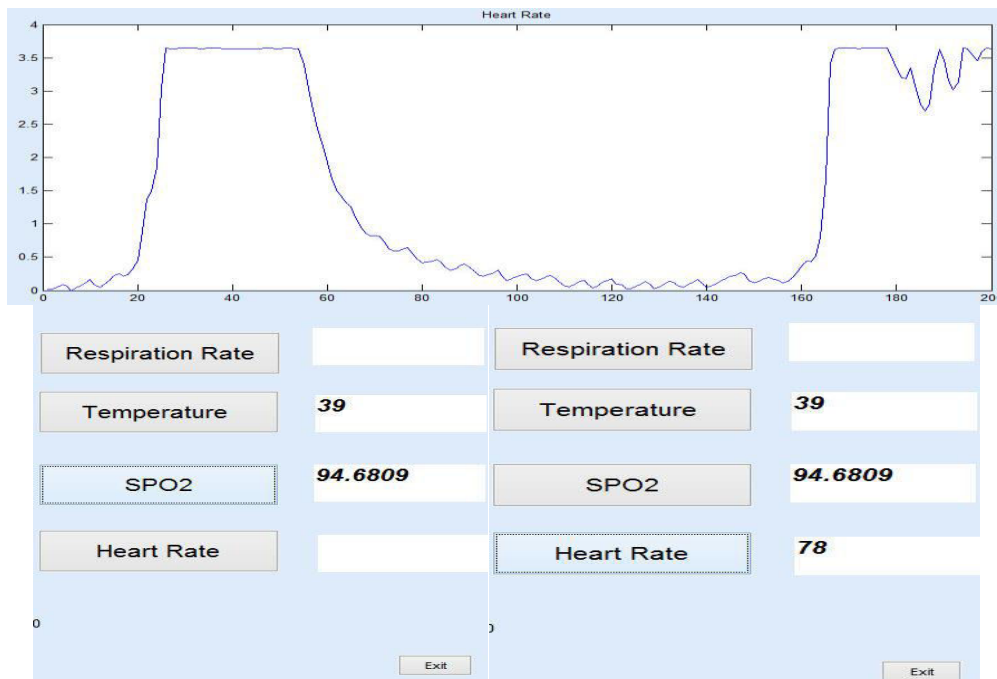
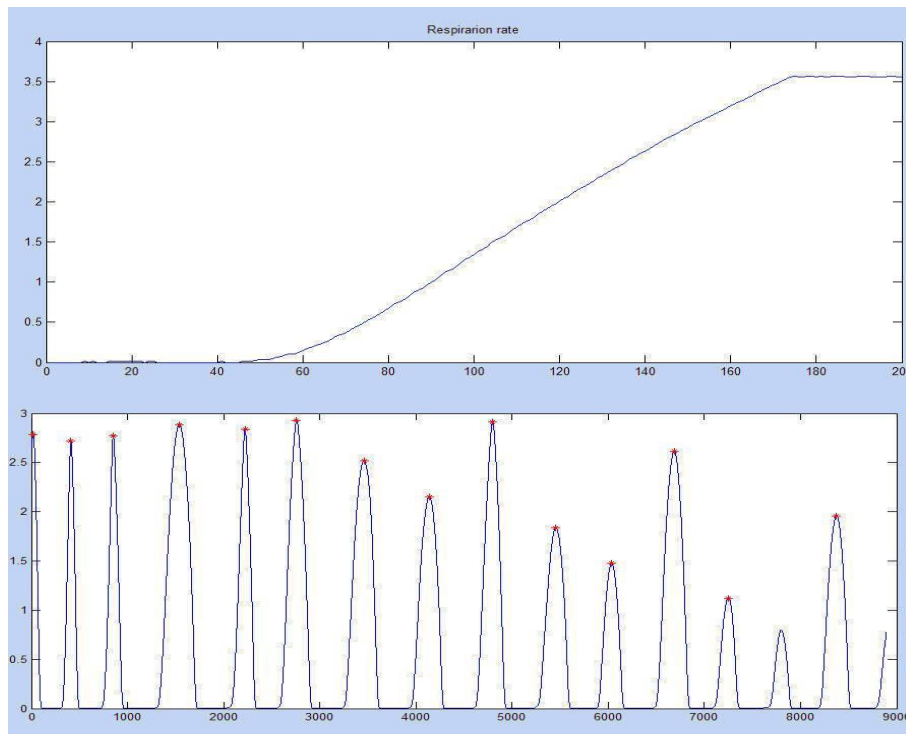


Figure 6: SpO2 and Heart Rate Module Test Outputs

### III. Respiration / Airflow Sensor Module

A normal breathing rate for an adult at rest is 8 to 16 breaths per minute. For an infant, a normal rate is up to 44 breaths per minute. Tachypnea is the term that your doctor uses to describe your breathing if it is too fast, especially if you have fast, shallow breathing from a lung disease or other medical cause.



Respiration Rate	14
Temperature	38
SPO2	
Heart Rate	
<input type="button" value="Exit"/>	

**Figure 7: Set of Outputs for Respiration Rate Module**

## 10. CONCLUSION & FUTURE ENHANCEMENTS

This paper introduces an ease installed framework outline and execution for observing the health condition of elderly who stay alone or alongside the overseers at home. The framework can be further streamlined with the messaging module which can send the messages to the individual medicinal group at the season of crisis. This improvement will be considered with higher need. Additional to that an application for handheld devices can be developed which can make the work of tracking the status of health much easier to the care takers. Further the project will be migrated to the android platform application and will be tested with different conditions of the human body.

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# FDI Inflows Towards Selected Indian Manufacturing Industries – An Analytical Study

Paper ID	IJIFR/V3/ E9/ 010	Page No.	3248-3252	Subject Area	Commerce
Key Words	Foreign Direct Investment, Automobile Sector, Trends And Determinants, Domestic Market				

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## Abstract

*India is been identified as one of the most attractive long-term investment destinations. The presence of large domestic market, fairly well developed financial architecture and skilled human resources are attracting the FDI inflows to the country. The automobile sector is also in the race of receiving FDI inflows from foreign countries. This paper is an attempt to show the trends and determinants of FDI inflows to the automobile sector of India. It is been identified that even though the FDI inflows to the automobile sector is fluctuating year after year the sector is developing and is able to receive good amount of capital inflows.*

## 1. INTRODUCTION

Foreign Direct Investment (or FDI) is an investment made by a company or entity based in one country, into a company or entity based in another country. Foreign direct investments differ substantially from indirect investments such as portfolio flows, wherein overseas institutions invest in equities listed on a nation's stock exchange. Entities making direct investments typically have a significant degree of influence and control over the company into which the investment is made. Open economies with skilled workforces and good growth prospects tend to attract larger amounts of foreign direct investment than closed, highly regulated economies.

## 2. FDI IN INDIA



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Foreign Direct Investment (FDI) is a major source of non-debt financial resource for the economic development of India. Foreign companies invest in India to take advantage of relatively lower wages, special investment privileges such as tax exemptions, etc. For a country where foreign investments are being made, it also means achieving technical know-how and generating employment. The Indian government's favourable policy regime and robust business environment have ensured that foreign capital keeps flowing into the country. The government has taken many initiatives in recent years such as relaxing FDI norms across sectors such as defence, PSU oil refineries, telecom, power exchanges, and stock exchanges, among others.

### **2.1 Profile of Indian Automobile Industry**

The Indian auto industry is one of the largest in the world with an annual production of 23.37 million vehicles in FY 2014-15, following a growth of 8.68 per cent over the last year. The automobile industry accounts for 7.1 per cent of the country's gross domestic product (GDP). The Two Wheelers segment with 81 per cent market share is the leader of the Indian Automobile market owing to a growing middle class and a young population. Moreover, the growing interest of the companies in exploring the rural markets further aided the growth of the sector. The overall Passenger Vehicle (PV) segment has 13 per cent market share. India is also a prominent auto exporter and has strong export growth expectations for the near future. In FY 2014-15, automobile exports grew by 15 per cent over the last year. In addition, several initiatives by the Government of India and the major automobile players in the Indian market are expected to make India a leader in the Two Wheeler (2W) and Four Wheeler (4W) market in the world by 2020.

### **2.2 Investments**

In order to keep up with the growing demand, several auto makers have started investing heavily in various segments of the industry during the last few months. The industry has attracted foreign direct investment (FDI) worth US\$ 13.48 billion during the period April 2000 to June 2015, according to data released by Department of Industrial Policy and Promotion (DIPP).

Some of the major investments and developments in the automobile sector in India are as follows:

- Global auto major Ford plans to manufacture in India two families of engines by 2017, a 2.2 litre diesel engine codenamed Panther, and a 1.2 litre petrol engine codenamed Dragon, which are expected to power 270,000 Ford vehicles globally.
- The world's largest air bag suppliers Autoliv Inc, Takata Corp, TRW Automotive Inc and Toyoda Gosei Co are setting up plants and increasing capacity in India.
- General Motors plans to invest US\$ 1 billion in India by 2020, mainly to increase the capacity at the Talegaon plant in Maharashtra from 130,000 units a year to 220,000 by 2025.

- US-based car maker Chrysler has planned to invest Rs 3,500 crore (US\$ 525 million) in Maharashtra, to manufacture Jeep Grand Cherokee model.
- Mercedes Benz has decided to manufacture the GLA entry SUV in India. The company has doubled its India assembly capacity to 20,000 units per annum.
- Germany-based luxury car maker Bayerische Motoren Werke AG's (BMW) local unit has announced to procure components from seven India-based auto parts makers.
- Mahindra Two Wheelers Limited (MTWL) acquired 51 per cent shares in France-based Peugeot Motorcycles (PMTC).

### **2.3 Government Initiatives**

The Government of India encourages foreign investment in the automobile sector and allows 100 per cent FDI under the automatic route.

Some of the major initiatives taken by the Government of India are:

- Government of India aims to make automobiles manufacturing the main driver of 'Make in India' initiative, as it expects passenger vehicles market to triple to 9.4 million units by 2026, as highlighted in the Auto Mission Plan (AMP) 2016-26.
- In the Union budget of 2015-16, the Government has announced to provide credit of Rs 850,000 crore (US\$ 127.5 billion) to farmers, which is expected to boost the tractors segment sales.
- The Government plans to promote eco-friendly cars in the country i.e. CNG based vehicle, hybrid vehicle, and electric vehicle and also made mandatory of 5 per cent ethanol blending in petrol.
- The government has formulated a Scheme for Faster Adoption and Manufacturing of Electric and Hybrid Vehicles in India, under the National Electric Mobility Mission 2020 to encourage the progressive induction of reliable, affordable and efficient electric and hybrid vehicles in the country.
- The Automobile Mission Plan (AMP) for the period 2006–2016, designed by the government is aimed at accelerating and sustaining growth in this sector. Also, the well-established Regulatory Framework under the Ministry of Shipping, Road Transport and Highways, plays a part in providing a boost to this sector.

### **2.4 Road Ahead**

India's automotive industry is one of the most competitive in the world. It does not cover 100 per cent of technology or components required to make a car but it is giving a good 97 per cent, as highlighted by Mr Vicent Cobee, Corporate Vice-President, Nissan Motor's Datsun. Leading auto maker Maruti Suzuki expects Indian passenger car market to reach four million units by 2020, up from 1.97 million units in 2014-15. The Indian automotive sector has the potential to generate up to US\$ 300 billion in annual revenue by 2026, create 65 million additional jobs and contribute over 12 per cent to India's Gross Domestic Product, as per the Automotive Mission Plan 2016-26 prepared jointly by the

Society of Indian Automobile Manufacturers (SIAM) and government. (Exchange Rate Used: INR 1 = US\$ 0.0151 as on November 15, 2015)

### 3. OBJECTIVE OF THE STUDY

The study is conducted with the objective of analysing the trends and determinants of FDI inflows to Indian Automobile sector.

### 4. DATA AND METHODOLOGY

In pursuance of the above mentioned objective, the data required for the study are collected through secondary sources like official publications, publications of Government of India, Department of Industrial Policy and promotion, RBI publications etc. The collected data is analysed using the appropriate statistical tools.

### 5. ANALYSIS AND INTERPRETATION

**Table 1: Trends in FDI inflows to India**

Year	FDI Inflow (US \$ millions)	Percentage growth
2010-11	34847	-8%
2011-12	46556	+34%
2012-13	34298	-26%
2013-14	36046	+5%
2014-15	44877	+24%

Source: Department of Industrial Policy and Promotion

The above table shows that the FDI inflows to India have fluctuated year after year from -8% to 24%. During the recent year 2014-15 the FDI inflows have increased from US\$ 36046 million to US\$ 44877 million due to the expectations of Make in India Policy towards developing the nation which may yield more income to the investors.

**Table 2: FDI inflows to Indian Automobile industry from 2010-11 to 2014-15**

Year	FDI Inflow (US \$ millions)	Percentage growth
2010-11	1331	+10%
2011-12	923	-31%
2012-13	1537	+67%
2013-14	1517	-1.3%
2014-15	2570	+69%

Source: Department of Industrial Policy and Promotion

The FDI inflows to the automobile sector has also fluctuated a lot with highest amount of US\$ 2570 million in the year 2014-15 and lowest being at US\$ 923 million in the year 2011-12. This shows that there is a drastic change in the automobile sector and new investments are taking place which may lead to new innovations in the sector and the development of the nation.

Table 3: Percentage share of FDI of Automobile Industry in total FDI inflow

Year	Total FDI Inflow (US \$ millions)	FDI inflow to Automobile Industry (US \$ millions)	Percentage Share
2010-11	34847	1331	3.8%
2011-12	46556	923	1.9%
2012-13	34298	1537	4.4%
2013-14	36046	1517	4.2%
2014-15	44877	2570	5.7%

From the above table it can be said that 5.7% of the total FDI inflow is been catered towards to the automobile sector. This indicates that the more amounts of FDI are flowing to the automobile sector leading to the development of the sector.

## 6. CONCLUSION

FDI has helped the Indian economy grow and the government continues to encourage more investments of this sort. Attracting foreign direct investment has become an integral part of the economic development strategies for India. FDI has been a booming factor that has bolstered the economic life of India. Over the years FDI flow is increasing. However India has tremendous potential for absorbing greater flow of FDI in the coming years. Due to the introduction of Make in India policy the Government of India is expecting to receive more amounts of FDI inflows and thus the country can develop in all the sectors.

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# Womance Depicted In Malayalam Cinema With Special Reference To The Movie Desatanakkili Karayarilla

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## Abstract

*Desatanakkili Karayarilla (1986) is a Malayalam movie written and directed by the eminent film maker Padmarajan. It was critically acclaimed, being one of the first Malayalam films that talked about womance which was considered taboo till then. A womance is a close but non-sexual relationship between two or more women, a form of affectional or homosocial intimacy. The word womance is a portmanteau of the words woman and romance. The movie stars Mohanlal, Karthika, Shaari and Urvashi in pivotal roles. The film tells the story of two school girls who eloped while going on a school trip in order to punish their teacher Devika who organised their trip. Their journey is soon interrupted by a mysterious man, Harisankar, who strangely befriends the girls and begins a romantic relationship with one of them. Towards the end of the movie the girls fall in to a huge misery and they commit suicide. Being first of its kind the movie is a humble attempt of the maker to bring out shades of lesbian love in a complicated relationship between two school girls. The film is an exploration of a world of freedom and independence through the love they feel for each other, the hindrances they come across and the final choice to surrender to love that they make. This paper deals with how the director Padmarajan portrays a gay relationship, way ahead of its times in a conservative society like Kerala. The core feelings of the major women characters in the movie shall also be examined in this paper.*

## 1. INTRODUCTION

*Desatanakkili Karayarilla* is a 1986 Malayalam film written and directed by the renowned film maker Padmarajan. It was critically acclaimed well, being one of the first Indian films that talked about womance which was considered taboo till then. A womance is a close but non-sexual relationship between two or more women, a form of affection or homosocial intimacy. The word *womance* is a portmanteau of the words *woman* and *romance*.

Homosexual love remains one of the great taboos of Indian cinema, to be broken only cautiously. There have been hints and side characters in many movies down the years regarding this theme. Film-makers should try to look beyond the family friendly man-loves-woman binary and venture into riskier terrain.

## 2. THE MOVIE IN DEPTH

Being first of its kind the movie, *Desatanakkili Karayarilla* is a humble attempt of the maker to bring out shades of lesbian love in a complicated relationship between two school girls. The film is an exploration of a world of independence and freedom through the love they feel for each other, the hindrances they come across and the final choice to surrender to love that they make. Way ahead of its times in a conservative society like Kerala's, director Padmarajan brilliantly portrays a gay relationship in a non-label, non-in-your-face kind of story telling that those who can figure out the nuances of gay love figures it out intensely while the regular 'family crowd' sees only an innocent bond of friendship between two girls which needs to be accepted. The director's success is that it was a box office hit when it was released back in the mid-eighties and viewers accepting the wonderfully nuanced film for whatever they thought it stood for.

The movie stars Mohanlal, Karthika, Shaari and Urvashi in pivotal roles. The film tells the story of two school girls, Sally who is played by Shaari and Nirmala who is called as Nimmy (Karthika) who eloped while on a school trip in order to punish their teacher Devika (Urvashi) who organised the trip. Their journey is soon interrupted by a man, Harisankar (Mohanlal), who mysteriously befriends the girls and begins a romantic relationship with Nimmy. Sally strongly objects to this relationship and warns her friend against the suspicious nature of the man. Nimmy, who was almost convinced to leave everything behind to be with the man she loves, gets a shock when she finds out that the man was actually in love with the teacher whom she despised and ran away from. Unable to find a way out of the misery that befalls them, Sally and Nimmy cling on to each other and commit suicide.

## 3. RELEVANCE OF TITLE

The title of the film means migrating bird never cries. Migrating birds do not make home. They need not bother about relationships and ties. They make bonds; fly away for making other bonds. The title itself suggests the film deals with queer world. Queers like lesbians, gays, bisexuals and trans genders are considered outcasts by heterosexual

community as they do not engage in marriage and procreation. They do not settle anywhere rather fly like a migrating bird from one shore to another.

#### **4. DECONSTRUCTING THE MOVIE**

The first scene of the film itself shows the bond between the two girls, Sally and Nimmy. They were coming down some steps holding hands together. There Nimmy tells Sally, "Running away always saves you". It can be read as Sally's inherent nature of escaping from one situation to another. She always wants to escape from one shore to another and does not want to settle anywhere. One day on ground Nimmy placing her head on Sally's lap tells about her turbulent family life. Sally tells, "If it's like that we can escape from here. Far away, somewhere safe". Sally always wants Nimmy with her and she protects Nimmy overtly. Sally tells Nimmy, "I shall protect you from everyone". The connotation Padmarajan used "Far away, somewhere safe" has a lot of significance in case of queer people. Queer people always like to conceal themselves from normal public.

Sally and Nimmy skulk during the tour to punish their teacher Devika. They had to change their dress in some unforeseen circumstances. Sally changes her dress quickly without any hesitation. But Nimmy is shown shy, hesitant and timid. In all the scenes where Sally and Nimmy comes together gender roles are shown as that of a man and woman. Sally automatically takes the role of a man, protector and Nimmy becomes a submissive woman. After reaching a room in Nambeesan's home stay after skulking the trip, both Sally and Nimmy feels relieved. Nimmy looks through the window and asks Sally, "Is this the safe place you had said about?" to which Sally replies, "Till I find one".

Padmarajan has wilfully selected a port city that is Cochin with sea, beaches and boats to add significance to title. It shows that these two characters are like two migratory birds getting ready to migrate. The song sequence "Vanampadiyetho", looks like a normal duet film song with man and woman but the only difference is that here two girls are in its place. The director has carefully placed two girls in beaches, parks, film theatres, hotels and roads. They walk freely and valiantly together like any other hetro couple. Soon Nimmy begin to work in an antic shop. On the walls of the shop it was written "Old things shall be sold". It connotes that old life styles are updated and society needs to change for gay people. By narrating failure of different hetrosexual families the director is hinting at a new form of family life.

Hari sees the girls in a restaurant and he doubts whether he has seen them anywhere else especially Nimmy who he might have seen a photo of them in newspaper. Hari tells them, we will part as friends but not as strangers. He also tells that, "I was also banished like you. May be you have done it on your own". It hints at social exclusion of gays. Many queer people are kicked out of their houses or they voluntarily go out of homes and form families of likeminded people. At one situation sally tells Nimmy, "We haven't killed anyone". It goes with queer slogan love is beyond gender and it is not a crime. There are three women characters in the movie, Devika, Sally and Nimmy. All the

three are completely different from each other. The character difference of Sally and Nimmy shall be discussed in detail.

## 5. SALLY MANNISH BEHAVIOUR

Throughout the film Sally is portrayed as a tomboy, rough and tough type. Mostly she sheds or tries to shed her feminine qualities and adopts manly behaviour. She loves to wear shirts, jeans and pants and she cuts her hair short. But her feminine qualities like love and care appear in case of Nimmy. She protects Nimmy with utmost care and loves Nimmy dearly. She plans to have a life with her secretly and she wants to elope from bonded chains of traditional family. Her father and mother also live separately in Mauritius and she does not like to be stuck anywhere rather she wants to fly from one shore to another. Padmarajan does not clearly tell us that she is a lesbian. But he gives us clues through some dialogues delivered by Sally at the end of film when Nimmy tries to commit suicide, Sally tells her, "You have never really understood me my dear".

## 6. NIMMY'S COMPLEX CHARACTER

Nimmy is the most complex character among the three main women characters in the movie. This character is multi-dimensional. Every second the character changes shape like anything and it is complicated to read her mind. She is somewhat meek, tradition bound but at times she looks egotistical and aggressive. She is mostly obedient to Sally's orders but at times she airs her own opinion. Her submissiveness to Sally and Harishanker at the same time lands her in trouble and she reaches in a puzzled state. At one end, her friendship and decision making with Sally and at the other end her love for Hari is hesitant. Nimmy was almost persuaded to leave everything behind to be with Hari whom she loves. But soon she finds out that Hari is in love with Devika which shatters her dream to have a family life with him. Unable to find a way out of the misery that befalls on her, Nimmy decides to commit suicide.

## 7. CONCLUSION

Through the movie, *Desadanakkili Karayarilla* Padmarajan brings out shades of lesbian love in a complicated relationship between two school girls. The film successfully explores a world of independence and freedom through the love they feel for each other, the hindrances they come across and the final choice to surrender to love that they make.

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# A Review On Metamorphic Testing

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## Abstract

*Metamorphic testing is a new and innovative technique, which is used to determine if a test execution uncovers a fault. This is a more practical method than the test oracle method. Oracle is the big issue in testing that only compares the generated output to the predicted output. It is used as a component for figuring out results either successful or not. By contrast, metamorphic testing applies a modification to a test input and utilizes metamorphic relations. It then observes how the program output changes into a different one as a result. Metamorphic testing changes the way that software is tested. This paper illustrates the overview about metamorphic testing, various benefits of metamorphic testing technique with contrast to another techniques of software testing and various challenges regarding metamorphic testing.*

## 1. INTRODUCTION

This state of the art technique is relatively novel. Metamorphic testing was first introduced in 1998[1]. In the past 18 years, this technique has been applied in an array of fields such as web services and computer graphics. The goal of this report is to discuss and summarize research on metamorphic testing. Usually, software testing consists of running a certain program using test inputs and then checking the results. In order to check these results, a test oracle is used. This oracle usually consists of checking the output by comparing an expected result with the observed output. This process can be very costly at times. Other times, an oracle does not exist. There is also substantial room for error. This probability is particularly considerable when dealing with programs which produce complex output, for

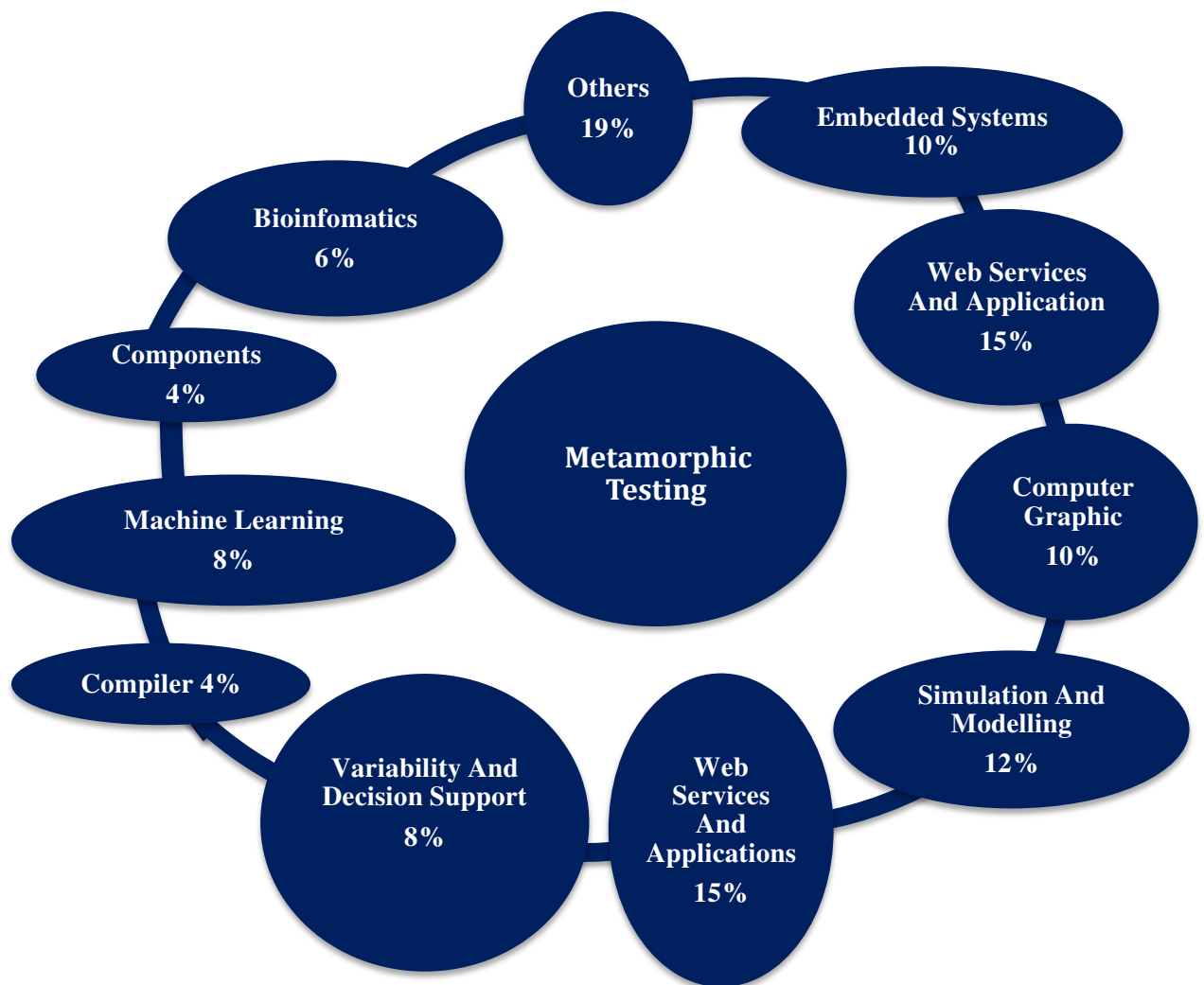
example, complicated numerical simulations or a code generated by a compiler. In these cases predicting the correct output and then comparing it to the expected output will be likely to cause error. This particular problem is known widely in the software testing community as the oracle problem and it is one of the biggest challenges of software testing.

## **2. HISTORY OF METAMORPHIC TESTING**

The very first hints of the concept of metamorphic testing can be found in some works which were written before 1998. The first introduction of metamorphic testing, as it is known today, is found in a technical report by Chen et al. The subject of metamorphic is a promising field which will bring breakthroughs in research. Today the use of software around the world has been growing exponentially. At the same time there have been increasing reports of faults within software. Both the software industry as well as the academic community has in interest in the assurance of quality software. This assurance of quality software is done through software testing. The goal of software testing is to detect as many faults in software possible and to detect these faults in the quickest method possible. An oracle can be used to verify the correctness of a test result for any given test case. As mentioned before, an oracle may be too expensive or simply not available. That is why metamorphic testing is a more practical option. While, there have been other ways of solving the oracle problem [2]

## **3. TECHNIQUES FOR FINDING FAULTS**

- I. One method is the construction of oracles from formal specifications. For example Heirons developed algorithms for two types of conformance relationships. This was to test physically distributed systems using the framework of finite state machines. One must note that this approach requires specifications which are expressed in a formal notation form. However this is not always possible. For this reason metamorphic testing is more practical. Metamorphic testing is applicable regardless of how the specifications may be written [2].
- II. Another technique which has been used is called the assertion checking technique. During the programming phase, assertions are embedded in the source code. These assertions constrain different portions of the source code. When executing the program, one can find faults in the software by looking for violations on the constraints at runtime. In contrast, metamorphic testing requires that the program be executed multiple times. However, when comparing both these methods, it has been demonstrated that metamorphic testing consistently finds more fault than assertion testing. Metamorphic testing therefore has a greater fault detecting capability. A downside is though, that metamorphic testing usually incurs additional overheads than incurred under the assertion checking technique.



**Figure 1: Different Applications Graph**

In contrast, metamorphic testing requires that the program be executed multiple times. However, when comparing both these methods, it has been demonstrated that metamorphic testing consistently finds more fault than assertion testing. Metamorphic testing therefore has a greater fault detecting capability. A downside is though, that metamorphic testing usually incurs additional overheads than incurred under the assertion checking technique. An additional technique which is used the technique of utilizing different versions of the program under test. This is called the fault tolerance technique. These different versions then take the role of the test oracle. This approach is also not always reliable. Sometimes different versions of the program are not always developed independently. There is also a risk of faults which are common to all versions of a program appearing. Some have proposed that this method should be used in situations where one and only one version of a program is in existence. The problem with this technique is that it assumes the existence of an oracle and this assumption is not always correct. Also, given the nature of fault tolerance, this technique has the constraint that only the equality relationship is allowed.



#### **4. STEPS OF METAMORPHIC TESTING**

To put it simply metamorphic testing can be described in of four main steps[3].

- The first step is to look for the metamorphic relations. These can be found from the specification of the software which is under test[4].
- The second step is to use some traditional test case selection methods and to generate the source test case and execute them.
- The third step is to construct and to execute the follow up test case. This can be constructed from the source test cases based on metamorphic relations.
- The final step is to compare the results of both the source and the follow up test cases. These should be compared against metamorphic relations.

In step one, it is highly recommended that testers concur with software users or developers [5]. This is to make sure that the identified metamorphic relationships are correct and necessary properties for the software under test. It is for this reason that domain specific knowledge is required to fully understand the specification. Usually a metamorphic relation consists of two major parts. The first part is known as input relation. Input relation refers to the relationship between the inputs of source and follow up test cases. The second part is known as output relation. Output relation refers to the relationship which the outputs of source are supposed to hold with the follow up test cases [6].

**4.1 Properties of good metamorphic relations:** In order for metamorphic testing to be as effective as possible, it is crucial that the right relations be used. It is important that the relationships be designed with this in consideration [6]. In most case it is possible to identify a variety of metamorphic relations with different fault-detection capability. It is a good idea to use a variety of relations in order to test a program. One should use as many as possible in order for the test's efficiency to be at its maximum.

#### **5. APPROACHES OF TESTING**

One must also be able to select relationships which are the most effective. *Chen et al.* talk about two approaches in selecting relationships, namely, the white box approach and the black box approach [7].

- The black approach refers to selecting a relationship based on theoretical knowledge of the problem.
- The white box approach refers to selecting a relationship based on the program structure. They concluded that the black box approach alone is not adequate for distinguishing good metamorphic relations and that in order to select good metamorphic relations one should use a white box approach and look at the algorithm under test.

Others such as Mayer and Guderlei have disagreed with this [8]. In Contrast, they have concluded that certain metamorphic relations have limited effectiveness such as equalities or linear equations and those close to the implementation strategy. In addition, they found good metamorphic relations to be strongly inspired by the semantics of the program under test. Good metamorphic relations should also try to make execution of the follow-up test

case as different as possible from the source test case. As a matter of fact, *Asrafi et al.* have concluded that The higher the combined code coverage of the source and follow-up test case is, and the more the diversity of executions there are, will lead to more effective metamorphic relations[9]. Their study on two subject programs supported a strong correlation between coverage and fault-detection effectiveness on one of the programs. Cao et al. also performed a similar study. They analyzed the relation between fault-detection effectiveness of metamorphic relations and test case dissimilarity. In order to do this, they performed an extensive experiment. They found that with 83 faulty programs and 7 distance metrics between the execution profiles of source and follow-up test cases there was a strong and statistically significant correlation between the fault-detection capability of metamorphic relations and the distance among test cases. This distance occurred particularly when using branch coverage Manhattan distance [10].

It has also been shown that those metamorphic relations which derived from the components of a system are usually better at detecting faults in comparison to metamorphic relations which come from the whole system. Metamorphic relations which tend to target specific parts of the program under test are easier in regards to construction. They are also more constrained. This makes them more effective in detecting faults in contrast metamorphic relations at the system level. It is also important that metamorphic relations are described in a formal manner.

## **6. CHALLENGES OF METAMORPHIC TESTING**

- I. One challenge to the use of metamorphic testing is that there is a lack of guidelines for the construction of good metamorphic relations. Even though many authors have attempted to lay down guidelines, these guidelines often compliment or contradict each other. There is strong need for clear step by step guidelines on constructing metamorphic relations [9].
- II. The biggest challenge perhaps is the generation of likely metamorphic relations. Here too, there has been research but authors have yet to find a concrete solution. There have been some breakthroughs; however, these have been mostly been restricted in scope. This research has mostly dealt with numerical programs. Right now there is a need for research regarding the generation of metamorphic relations in other domains as well as the use of different techniques for rule inference. There is also a lack of material on the synergies between the problem of generating metamorphic relations and the detection of program invariants [11].
- III. Another challenge is the existence of an open problem regarding the combining of relationships. Many authors have written about the various pros of combining metamorphic relations. These combinations follow two different strategies. The first strategy consists of applying metamorphic relations in a chain style also known as IMT. The second strategy consists of the composing of metamorphic relations in order to construct new relations, also known as (CMR). There is still not enough literature which compares both of these strategies. Literature which talks about the heuristics to decide

when to use one or the other is much needed. Guidelines are needed to determine whether a given set of metamorphic relations can be combined and in which order[12].

- IV. Another challenge is the automated generation of source test cases. When applying metamorphic testing, a majority of papers use either randomly generated or existing test suites as source. On the down side, it is evident that the source test cases usually influence the effectiveness of metamorphic relations. Today, there are many pending questions in regards to which cases make up the best possible source test cases and how such cases can be generated.
- V. Another challenge is the lack of publicly available and maintained tools. Very few papers have been able to mention a tool for implementing various techniques which the papers present. This creates a problem for practitioners. If a practitioner wishes to apply metamorphic testing, they must implement their own techniques. This creates obstacles for these practitioners.

## 7. CONCLUSION

Metamorphic testing is an approach to the oracle problem in software testing. Metamorphic testing makes use of metamorphic relations for verifying test results as well as generating test cases. There are many applications of metamorphic testing there are also some challenges of this technique we will improve these in our research work.

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# A Study Of Academic Achievement Of Senior Secondary School Students Of Haryana State In Relation To Their Facebook Usage

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Page No.

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Subject Area

Education

KeyWords

Academic Achievement, 400 Adolescent Students, Rural & Urban Area Senior Secondary Schools, Descriptive Survey Method, Facebook Usage, Haryana, Sonapat From Eastern Zone, Sirsa From Western Zone, Panchkula From Northern Zone, Gurgaon From Southern Zone

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## Abstract

*This survey studies the relationship between academic achievement and facebook usage of adolescent school students of Haryana state. For the purpose a sample of 400 adolescent school students from various (randomly selected) schools were selected and obtained data was analysed by using mean, standard deviation and person's (r) correlation techniques. Results reveal that academic achievement and facebook usage of adolescent school students were highly and significantly correlated with each other.*

## 1. INTRODUCTION

Achievement is the motive drive behind all human activities. If there is no achievement, there would be no efforts. It can be considered as the pivotal force to provoke humans to put efforts and efforts are resulted in some output. In academic context, students, teachers, parents and organizations put efforts to obtain desired educational output. This output in academic context is called academic achievement. It can be obtained in any particular subject or aggregate in all subjects. Apart from subjects or academics, it also

can be considered in sports, acting, dance, drama etc. As there is a number of achievement types, there are also measures of achievement which are the parameters or levels to determine how much a person has achieved.

Academic achievement can be measured by a variety of tests, grades, marks, examinations, assessments etc. The most common method among all is examinations and marks or grades obtained. During school time, academic achievement is considered all above the academic activities. Parents, teachers and concerned are much worried for the academic achievement of their wards and students. They try to provide the best for students so that they can achieve the best. But there are so many functions and variables which affect students' academic achievement viz. intelligence, interest, attitude, memory, wisdom, environment at home and school, general health and daily routine of the students, which is highly affected by technology. Now days, every school going child is technology user. Internet is common to use and easily available on cell phones and laptops. Children are exposed to computers right from the admission in schools. They are taught in smart classes and themselves use technology for their projects and other academic activities. Apart from the academic use, they also use and participate in social sites such as facebook, twitter, hike messenger, etc. India is the 2<sup>nd</sup> largest facebook user in the world. 13 million users have been added on facebook within six months and now user base is reached to 125 million in India. Globally, it has 1.44 billion active users.

"India had always been a text-heavy market. This legacy, coupled with the attraction of connecting with like-minded people privately, is making the IM platforms perfect tool in our hands". (Parijat Chakraborty, Executive Director, TNS India). Data produced on "Live mint" (an E-paper) says that top three social network sites are used daily by all internet users in India, Facebook is used by 51% users, LinkedIn by 3% and Snapchat by 1% users. Facebook is the site used by the higher number of internet users in India. Now the question arises "does usage of facebook affect academic achievement of the school students?" The time spent on facebook is harmful or beneficial for school students, it is necessary to know because adolescent is the age when child finally shapes his/her personality and concepts. So the investigators took up the problem to examine the relationship between academic achievement and facebook usage of adolescent school students of Haryana state.

## **2. OBJECTIVES OF THE STUDY**

- I. To study the academic achievement of senior secondary school students of Haryana state.
- II. To study facebook usage among senior secondary school students of Haryana state.
- III. To study the relationship between academic achievement and facebook usage of senior secondary school students of Haryana state.

## **3. HYPOTHESIS**

There is no relationship between academic achievement and facebook usage of adolescent school students of Haryana state.

#### 4. RESEARCH PROCEDURE IMPLEMENTED

- I. **Method:** Descriptive survey method was used to conduct the study.
- II. **Population:** All adolescent students studying in school of Haryana state were the population of the study.
- III. **Sample:** 400 students of Haryana are the sample of the study. 4 districts are selected from each zone of Haryana i.e. Sonapat from eastern zone; Sirsa from western zone; Panchkula from northern zone and Gurgaon from southern zone. A list of Sr. Sec. Schools was obtained from the concerned District Education Officer of district. Furthermore, 10 schools from each district were randomly selected, where 5 schools are randomly selected from rural area and 5 were selected from urban area. 10 students per schools were selected. Thus, 400 students of Haryana are the sample of the study.
- IV. **Variables Of The Study**
  - Dependent: Academic achievement
  - Independent: Facebook usage.
- V. **TOOLS USED**
  - Annual result of class X was taken into consideration as academic achievement of adolescent school students of Haryana state.
  - Facebook Intensity Scale by Ellison et al. (2007) was used to measure facebook usage.
- VI. **STATISTICAL TECHNIQUE USED**

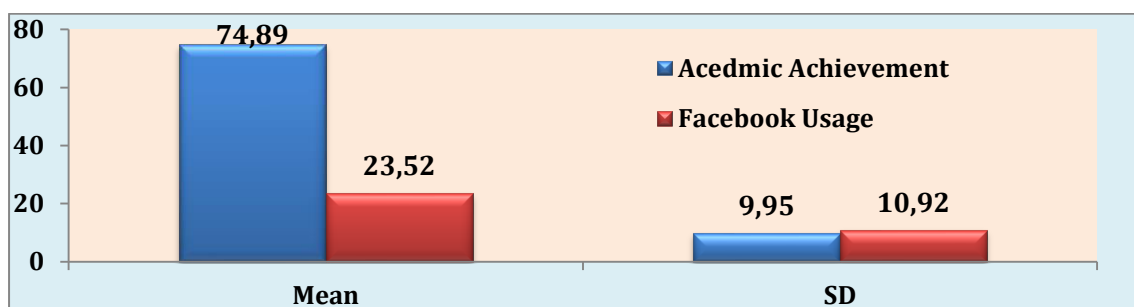
Data was analysed by using mean, standard deviation and Person's Product Movement (r) test.

#### 5. ANALYSIS AND INTERPRETATION

Obtained data was analyzed by using appropriate techniques. Results and findings are presented in the following tables and graphs:

**Table – 1: Academic Achievement and Facebook usage of adolescent school students of Haryana state**

Variable	N	Mean	SD
Academic Achievement	400	74.89	9.95
Facebook usage	400	23.52	10.92



**Graph – 1**

**Table – 2: Relationship between academic achievement and facebook usage of adolescent school students of Haryana state.**

Variables	N	R
Academic Achievement	400	.05**
Facebook usage	400	

Above tables and graph present a quick view of the obtained results. Table – 2 shows a highly significant and positive correlation between academic achievement and facebook usage of the subjects of present study. High academic achievers were found to be higher on facebook usage score.

## 6. CONCLUSION

On the basis of above results, it can be concluded that academic achievement and facebook usage of the subjects are positively and significantly correlated. Facebook usage may contribute in academic achievement but the subject of further exploration.

## 7. DELIMITATION OF THE STUDY

Present study was delimited to:

- i.) 400 adolescent school students of Haryana state.
- ii.) Only two variables – academic achievement and facebook usage.
- iii.) Dimensions measured by selected tools.

## 8. EDUCATIONAL IMPLICATIONS

Present study has valuable implications in the field of education and technology.

- i.) **For Teachers:-** Positive correlation between Facebook usage and Academic Achievement indicates that use of technology makes students more aware and more knowledge seeker , which contributes in achieving more academic achievement. Teachers should provide chances to the students to use technology and should encourage them to be more techno friendly. Teachers may guide the students to take the help of technology in their project works and assignments.
- ii.) **For Parents:-** Parents are seen worried on seeing their wards using internet and social sites. But the present study reveals positive effect of using technology with academics.
- iii.) **For Policies makers:-** The policies makers and curriculum developers can include technology in their policies, strategies and curriculum in such a way that students can use technology and social sites to enhance their knowledge.

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# Development Of An Algorithm To Data Retrieval And Data Conversion For The Analysis Of Spatiotemporal Data

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KeyWords: NetCDF, Big Data, Climate Data, Spatiotemporal data

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## Abstract

*In recent passed years we have seen so many Natural Disasters like Tsunami , Earth quake, Volcanoes, heavy rain, unexpected access temperature, wind storm etc. These are nothing but changes in the Climatic parameters. Even though there is a growing interest in the field of Climatic Studies for analyzing and visualization of the data, the above mentioned natural events or disasters could not be accurately predicted*

*well in advance. If the same could have been possible, so many casualties, injuries, loss of property, could definitely be reduced to certain extent, if not eradicated completely. To support the above activities like weather prediction or analysis of various climate events, the basic requirement is to collect the Climate Data in terms of various parameters like Rainfall, Humidity, Temperature, Wind speed etc. The major problem with the data collection is with the data format because it is a spatio temporal data. This data will be of huge in size, termed as 'Big data'. It is proposed to collect the data for the past 50 years and will be of multidimensional type. The main challenge here is to reduce the storage capacity by converting the various forms of data into a single form i.e. to NetCDF format. NetCDF format is being used as the standard format for the climatic studies and is of multidimensional form. This NetCDF formatted data is helpful for the further research in this area.*

## 1. INTRODUCTION

To define Weather, it is nothing but the state of the atmosphere. Most of the atmospheric events are captured in troposphere or the lowest layer of the atmosphere. Weather is a mixture of multiple parameters like air, temperature, atmospheric pressure, humidity, precipitation, solar radiation and wind. These factors can be individually considered to define typical weather patterns and to identify the quality of local atmospheric conditions. Since all the climate data are having Spatio-temporal resolution and it is available from different sources, it is very difficult to maintain in single database. Initially, in this work, we considered 15 climatic parameters over the last 50 years from various sources. All these data are having different resolution at spatially and temporally and most important thing is, these data are in different formats like Binary, ASCII, image, etc. Our effort is on bringing this entire multi source, multiform at data into single gridded binary data format. Here we have selected NetCDF data format as a standard data format because it is having the capacity to store the data at different dimensions. We have taken Data from satellites, Automatic weather stations, various sensors, etc. New retrieval algorithm is used to update the database automatically. Conversion tool is developed for converting the different data format into single NetCDF format in the Database. The main aim of this project is to develop efficient data retrieval algorithm, so that retrieved data can be converted and it is used for further processing.

## 2. SOFTWARE AND TOOLS USED

- A. CDO (Climate Data Operator):- CDO is a collection of command-line operators which manipulates and analyzes climate and numerical weather prediction data. It also supports NetCDF, GRIB1, GRIB2, and other formats.
- B. Microsoft visual studio 2010:- It is an environment from Microsoft for Integrated development. It is used to develop computer programs for windows based and web based applications.

- C. C# programming:- C# is a latest and the most innovative programming language which is incorporated in the common features of most of the industries and research languages.

### 3. SYSTEM DESIGN

Data flow Diagram of the project work is described in Figure 3.1 below. In the first step, Data from multiple sources like Remote sensing satellite, Automatic weather stations (AWS) and from different sensors are extracted through Data retrieval algorithms and is brought in to Central data repository or local server. Once the data is available in Local server, finally we can perform further processing such as data merging, data conversion etc.

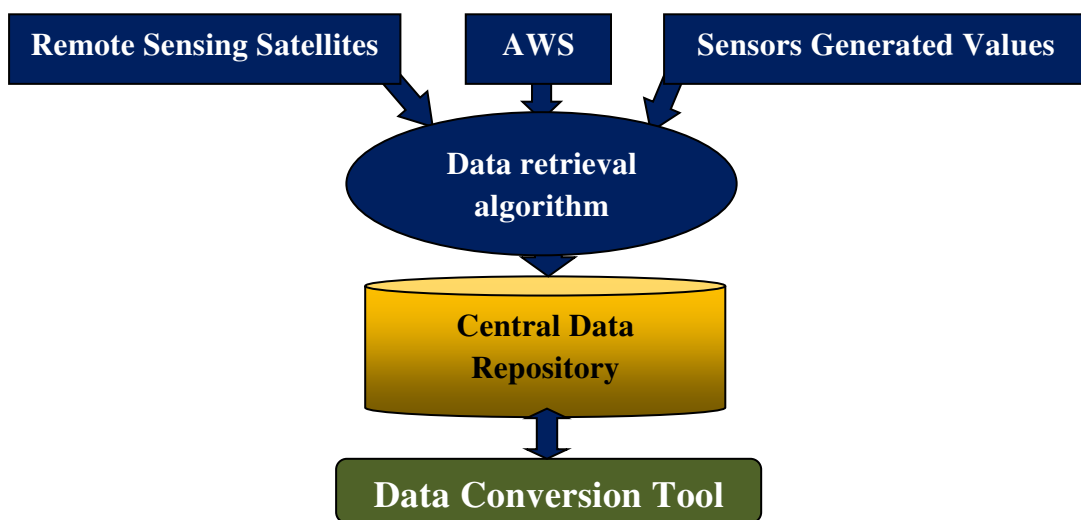


Figure 3.1 – Data Flow Diagram

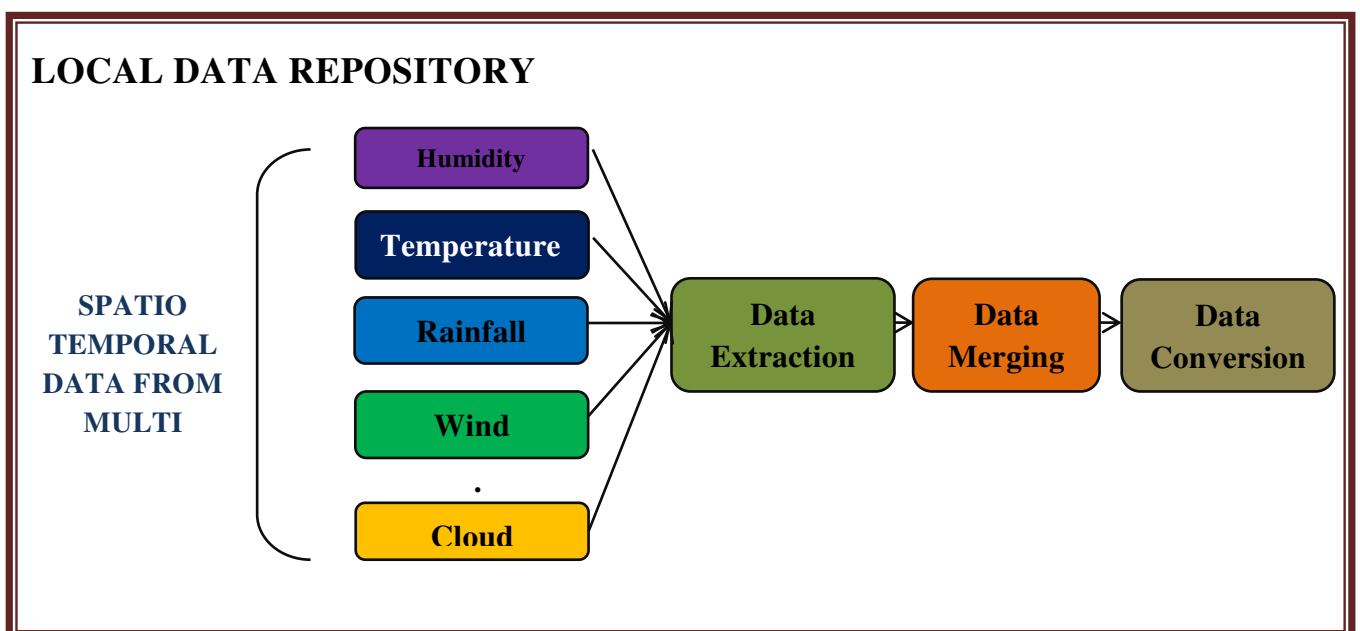


Figure 3.2-Schematic of system analysis

The above figure 3.2 shows present system analysis basically three work steps are considered:-

*First, Data Extraction:-* we will have to collect Different weather parameters like Humidity, Temperature, Rainfall, wind, Cloud coverage, sea ice concentration, soil moisture, potential evaporation, surface roughness, etc. from multi-sources such as different satellites, work stations etc. The above Data from different sources are brought under one platform (Central data repository) using Data retrieval algorithm. This algorithm also ensures uniqueness of the data i.e. for e.g.- if the weather data has been stored up to 2015, and if we give download option, it will not start downloading data of those up to 2015. Instead, it starts downloading data from 2016, thus avoiding duplication of data and utilizing the storage space and network bandwidth efficiently. Secondly, it recursively downloads the data which is accessed from various external sources. The data stored will also be in different formats like .bin (binary data), .ascii etc. The above things can be achieved using the below code.

**wget -r - - continue - timestamping URL**

*Second, Data Merging-* In this phase, data which are at different locations are merged into single folder. This single folder is automatically created dynamically. This is done prior to the conversion phase.

*Third, Data Conversion -* The two main components of Data conversion phase are

1. CDO (Climate data operator)-It is an open source software which is freely available.
2. Pthread.dll library – The library file has to be downloaded and copied to syswow64 folder.
3. Descriptor File - It is also called as Control file. Using one control file, we can read number of Binary files(or other form data).

Example for the control file:

```
dset ^3B42_daily.1998.%m2.%d2.7.bin
options template
title TRMM 3B42 V7 one day TRMM rainfall
undef -9999.9
xdef 1440 linear -179.875 0.25000000
ydef 400 linear -49.8750000 0.25000000
zdef 1 levels 1000
TDEF 60 linear 03Z1jan1998 1dy
vars 1
TRMM      0  99 Hourly Rain Rate (mm/hr)
Endvar
```

The below code which describes how to use CDO and the .ctl file:-

```
startInfo.FileName = "cmd.exe";
startInfo.WorkingDirectory
=
@"C:\Merge\DataRetrieval\bin\Debug\MergeRainfall";
```



```
File.Copy(@"C:\Merge\DataRetrieval\ControlFile.ctl",
@"C:\Merge\DataRetrieval\bin\Debug\MergeRainfall\ControlFile.ctl", true);
startInfo.Arguments = "/c cdo -f nc import_binary ControlFile.ctl Rainfall.nc";
lblConversion.Text = "Conversion Finished";
```

The result of the above is that the merged data which are in different formats are converted into a single common format i.e. NetCDF. Here, the descriptor file plays major role, that is, which takes n-number of files as input to the control file and produces single NetCDF file as output.

The main goal of this project is to convert multisource, multidimensional data into a single formatted data i.e. NetCDF. So, that the work of processing the data is simplified.

#### 4. RESULTS AND DISCUSSIONS

The development of efficient data retrieval algorithm and data conversion is well implemented and tested for the user to get the information about climate and weather parameters of their choice. It basically allows the user to select the parameters like humidity, rainfall, Temperature etc., which is presented in figure 4.1.

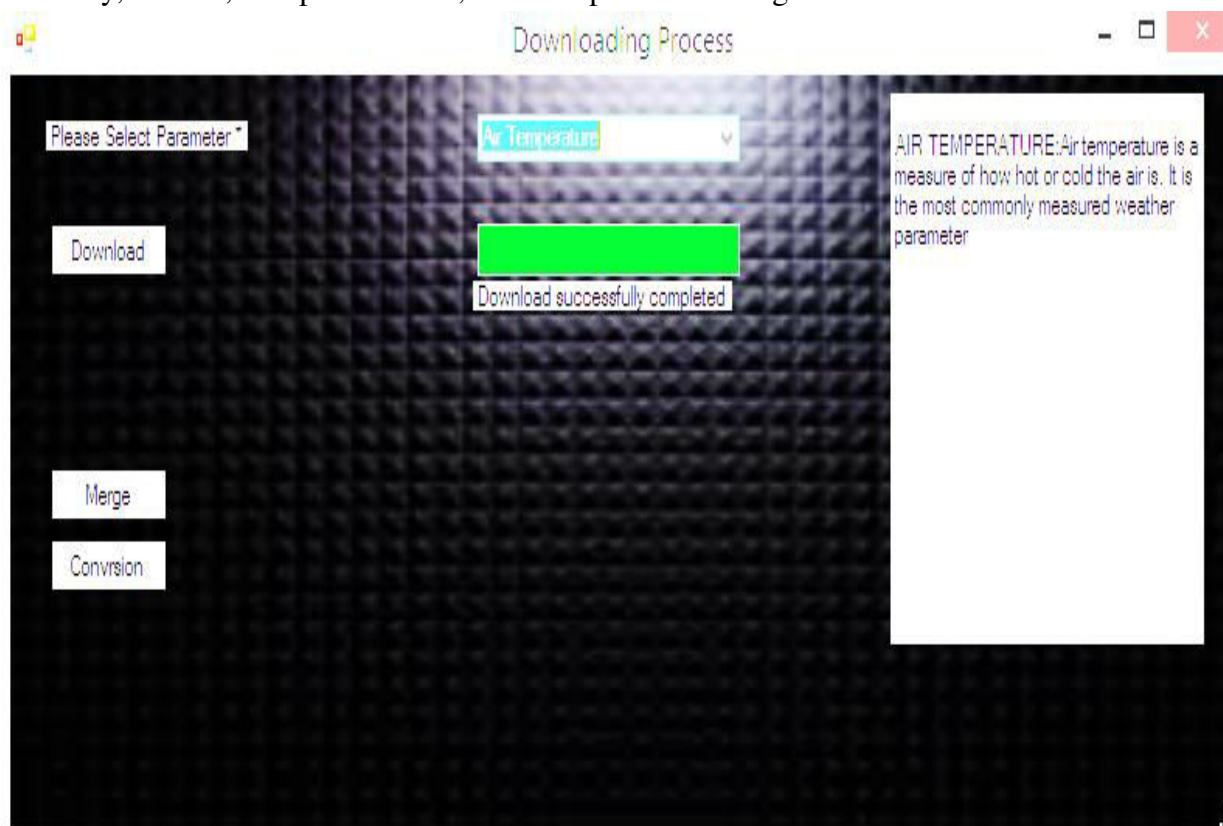


Figure 4.1:- User interface to select the parameters

After selection of the parameters, the data from various sources are extracted and accumulated in local database. This Data extraction phase is shown in figure 4.2 below.

```

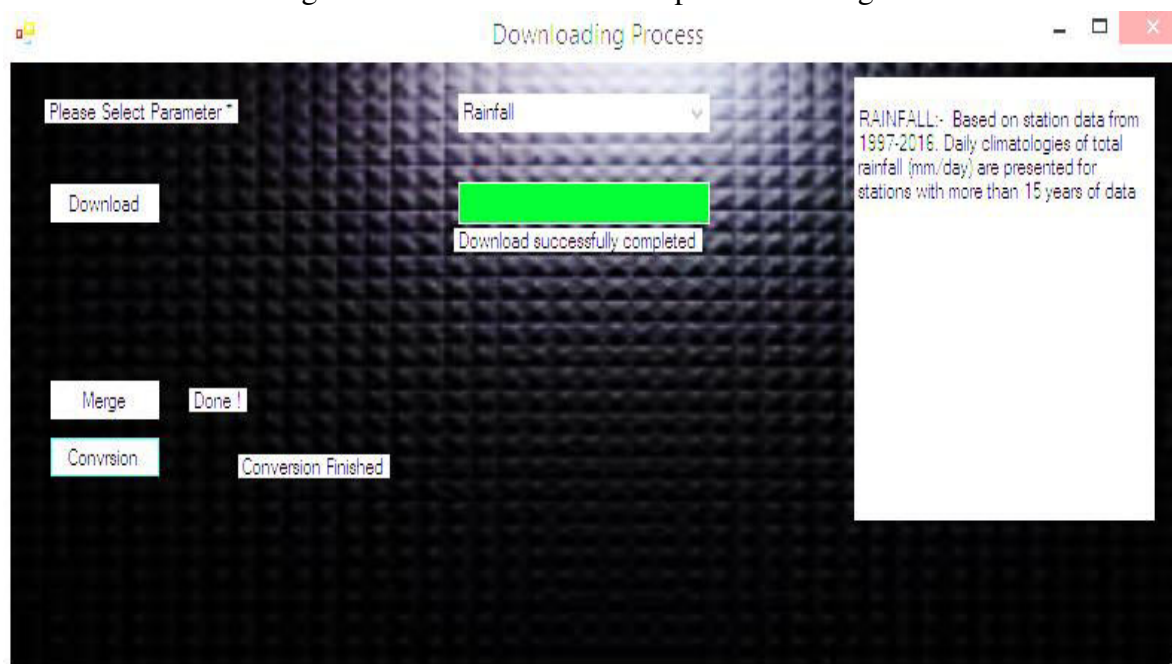
=> 'disc3.nascom.nasa.gov/data/s4pa/TRMM_L3/TRMM_3B42_daily/1998/009/
.listing'
==> CWD (1) /data/s4pa/TRMM_L3/TRMM_3B42_daily/1998/009 ... done.
==> PASU ... done. ==> LIST ... done.

[ <=> ] 172 --.-K/s in 0.02s
2016-03-14 20:06:47 (6.78 KB/s) - 'disc3.nascom.nasa.gov/data/s4pa/TRMM_L3/TRMM_
3B42_daily/1998/009/.listing' saved [172]
Removed 'disc3.nascom.nasa.gov/data/s4pa/TRMM_L3/TRMM_3B42_daily/1998/009/.listi
ng'.
The sizes do not match (local 1954400) -- retrieving.
--2016-03-14 20:06:47-- ftp://disc3.nascom.nasa.gov/data/s4pa/TRMM_L3/TRMM_3B42
daily/1998/009/3B42_daily.1998.01.10.7.bin
=> 'disc3.nascom.nasa.gov/data/s4pa/TRMM_L3/TRMM_3B42_daily/1998/009/
100%[+++++=====] 2,304,000 56.6K/s in 6.0s
==> CWD not required.
2016-03-14 20:06:55 (56.6 KB/s) - 'disc3.nascom.nasa.gov/data/s4pa/TRMM_L3/TRMM_
3B42_daily/1998/009/3B42_daily.1998.01.10.7.bin' saved [2304000]
Length: 2304000 (2.2M), 349600 (341K) remaining
--2016-03-14 20:06:55-- ftp://disc3.nascom.nasa.gov/data/s4pa/TRMM_L3/TRMM_3B42
daily/1998/009/3B42_daily.1998.01.10.7.bin.xml,262,400 55.5K/s eta 1s
=> 'disc3.nascom.nasa.gov/data/s4pa/TRMM_L3/TRMM_3B42_daily/1998/009/
3B42_daily.1998.01.10.7.bin.xml'
==> CWD not required.
==> PASU ... done. ==> RETR 3B42_daily.1998.01.10.7.bin.xml ... done.
Length: 2525 (2.5K)
100%[=====] 2,525 --.-K/s in 0.06s

```

**Figure 4.2- Downloading data from global server.**

Once the data is available in our local database, the next step is to Merge and Convert data of multi format into single NetCDF format. Same is presented in figure 4.3 below.



**Figure 4.3- Data Merge and Data Conversion Phase**

## 5. CONCLUSION

On the growing importance of climate studies and High Performance Computing, different users starting from a Farmer to a Scientist to a policy maker needs to understand the various changes in the weather and climate parameters like Temperature, rainfall, humidity etc. Data discovery from multi-source like satellite, automatic weather station, re-analysis products and numerical weather prediction model outputs can be easily used

and analyzed. At the end of the work, we will be able to develop an algorithm for data retrieval and data conversion to analyze spatio-temporal data. Since the spatio-temporal data is huge in size it is difficult to update our local database frequently and also it is necessary to bring all the updated information or data in to single format for further easy analysis. This analysis is required mainly for the Development of Automatized message alert system based on atmospheric extreme events and for Predictive Analysis and various other climate analyses by the researchers.

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# A Search Over Encrypted Data In A Cloud Service

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**KeyWords** Trapdoors, Efficient Search, Encryption, Search Algorithms

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## Abstract

Exponential growth throughout the world is increasing for the internet usage but it raises a lot of issues in the case of security, for this the cloud will plays an essential role to store the data. Due to the security issues at the provider end the cloud is entirely depending on the cryptographic techniques. The traditional encryption system encrypts the documents and provides the keywords to the documents when requested are made, but this type o system cannot be applied for the mobile devices because of latency, sensitivity and poor connection. Hence in our project we are using a encrypted system which makes use a compression method called trapdoor mechanism to compute the keywords of the corresponding documents and pre store in a trapdoor mapping table and when user searches a particular document in the cloud the keywords of the corresponding documents will be stored in a trapdoor mapping table hence the cloud server can return the search documents in a small amount of time for the faster retrieval of documents here we are using a ranked serial binary search algorithm.

## 1. INTRODUCTION

In today's data environment, cloud computing plays a major role in storing the data cloud computing becomes common due to the fact that it removes the load of huge scale data management in a cost effective manner. Hence there is a large amount of data like



personal health records to data in the mobile, at the same time to transfer all these personal data to the cloud server might lead to an security issues such servers are called as un trusted cloud servers hence the users are more concern about the privacy to store their personal documents in the cloud server. To mitigate these problem researchers came up with an encryption mechanism. To protect data security in the documents of cloud our project provides encryption system which overcomes the disadvantages of traditional encryption system, here our system is going to encrypt the documents and each document will have a unique keyword, index value before it is uploaded to the server these two are calculated and the keywords and indexes of the documents are encrypted before uploading to the cloud server. When user request certain documents from the cloud server they first send keywords to the original provider the provider will encrypt the keyword and index. And using this keywords and index the user will make a request to the cloud server and the server will return the top k documents to the user using a private key provided by the provider the user can decrypt the documents.

### 1.1 Literature Survey

For securing the data the previous algorithms cannot be applied to the cloud because of delay in the network traffic add long search time issues in the mobile cloud.

- i.) **Agrawalet** al. [2] proposed a one-to-one mapping order preserving to preserve a encryption but it leads to a privacy leak.
- ii.) **Wang** et al. [3] proposed a one-to-many mapping order preserving encryption method which requires a computation process which is complex, and hence it is not suitable for the mobile cloud, as well as here also encryption method leaks privacy.
- iii.) **Swaminathan** et al. [4] they employed an order-preserving encryption method in order to retrieve data from cloud which is encrypted to preserve the privacy of the encrypted data while retrieving from the cloud server. But this can be applies only to a single keyword which retrieves files in granular manner. This problem is solved to a certain extent using a homomorphic encryption but even this leads to a sort of privacy leaks.

### 1.2 Problem Definition

In this paper to overcome the limitations of traditional encrypted system like traffic and delay in search we are using trapdoor mapping table and ranked serial binary search algorithm to overcome the existing system issues.

### 1.3 Methodology

- i.) **Documents and indexes uploading process:**

Here providers are the one who is responsible for encrypting the index and keyword before storing to the cloud. And these terms must be retained and each and every term which is encrypted keyword is treated as an index. The encryption algorithm can use here classic symmetric-key cryptography algorithm. The index here is calculated for a



particular document based on the frequency of the each word count; finally provider will upload the documents and corresponding indexes, keywords to the cloud.

- ii.) **Trapdoor generation process:** To perform a search request user has to authenticate with the provider first then here providers sends the secrete key to the user to decrypt the documents stored in cloud. Once if authentication is successful the user can request the documents if it is invalid user can request the documents. On valid login provider going to compute the trapdoors for the documents.
- iii.) **Document retrieval process:** In this process, user which he received a trapdoor from the provider, using this trapdoors the user requests a cloud server then cloud will remove a noise in the trapdoor and searches for the documents then based on the keyword and index value the cloud sever will retrieve a top k documents to the user.

## 2. SYSTEM ARCHITECTURE

### 2.1 Traditional system for encryption

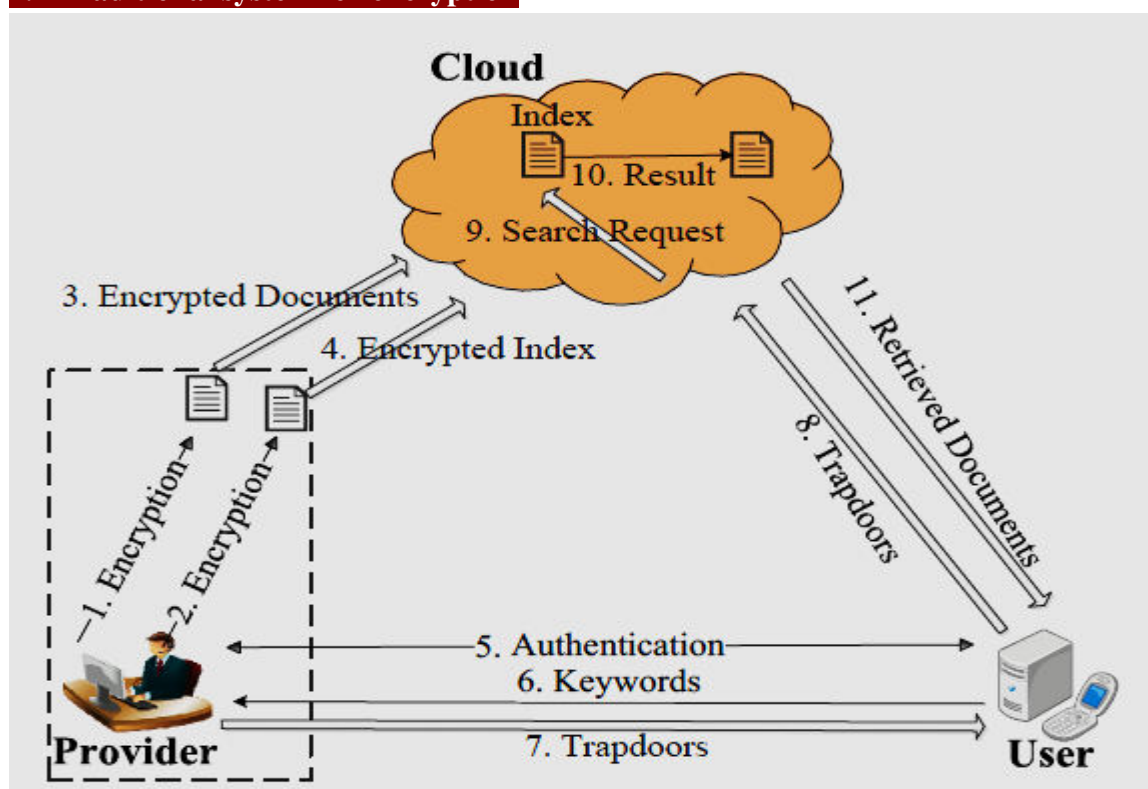
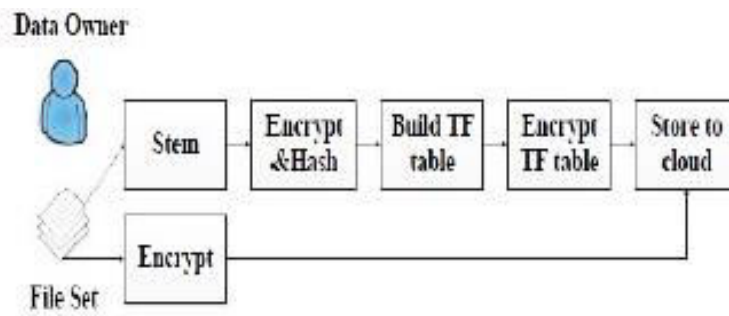


Figure 2.1 Traditional encrypted system

In the traditional encrypted system we have 3 participants one is user, provider and cloud server. The Provider will contain a set of documents and along with the indexes and uploads to a cloud server. Then the cloud server will store these set of documents. Then user is someone who request for a documents to the cloud server by providing an index and keyword value of the document and cloud server stores all the documents uploaded by the provider then returns the documents when user makes a request for particular one.

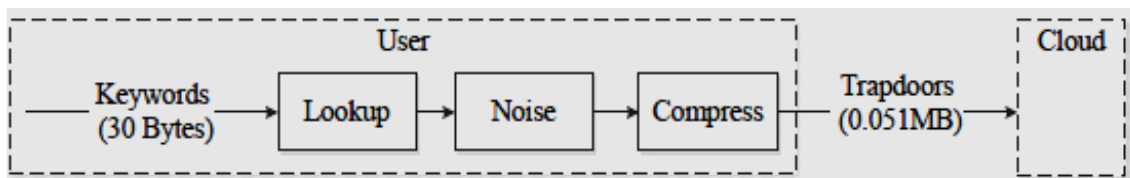


**Figure 2.2 preprocessing of index**

The data owner executes the pre-processing and indexing work for the files he has to upload to the server as shown in the above figure, every word will undergo a stream of words to retain the stem. Then data owner creates the index and store the encrypted index in to the cloud with encrypted file set.

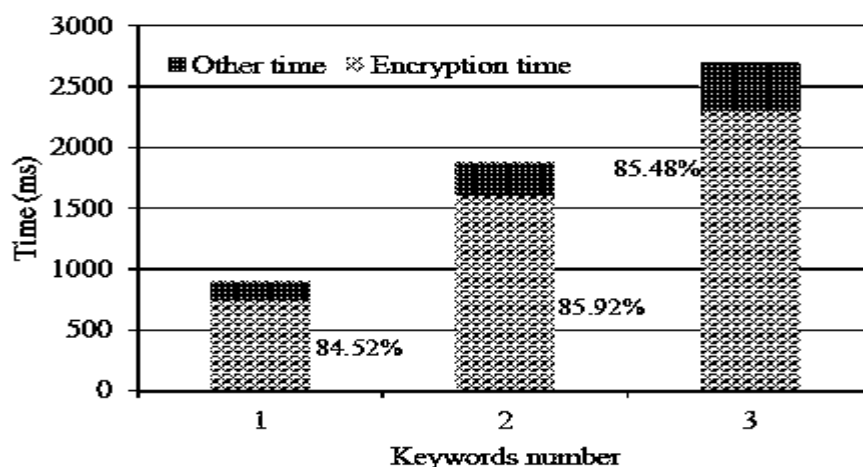
## 2.2 Encrypted system over mobile cloud

In this paper the proposed encryption model in which the trapdoors for the documents will be pre computed using a trapdoor compression method and the calculated trapdoors are stored in a trapdoor mapping table. Since we calculate the trapdoors before request made and stored in the table when user requests for a particular documents without any delay in network we can return the trapdoor back to the user so that the delay in the network is reduced.



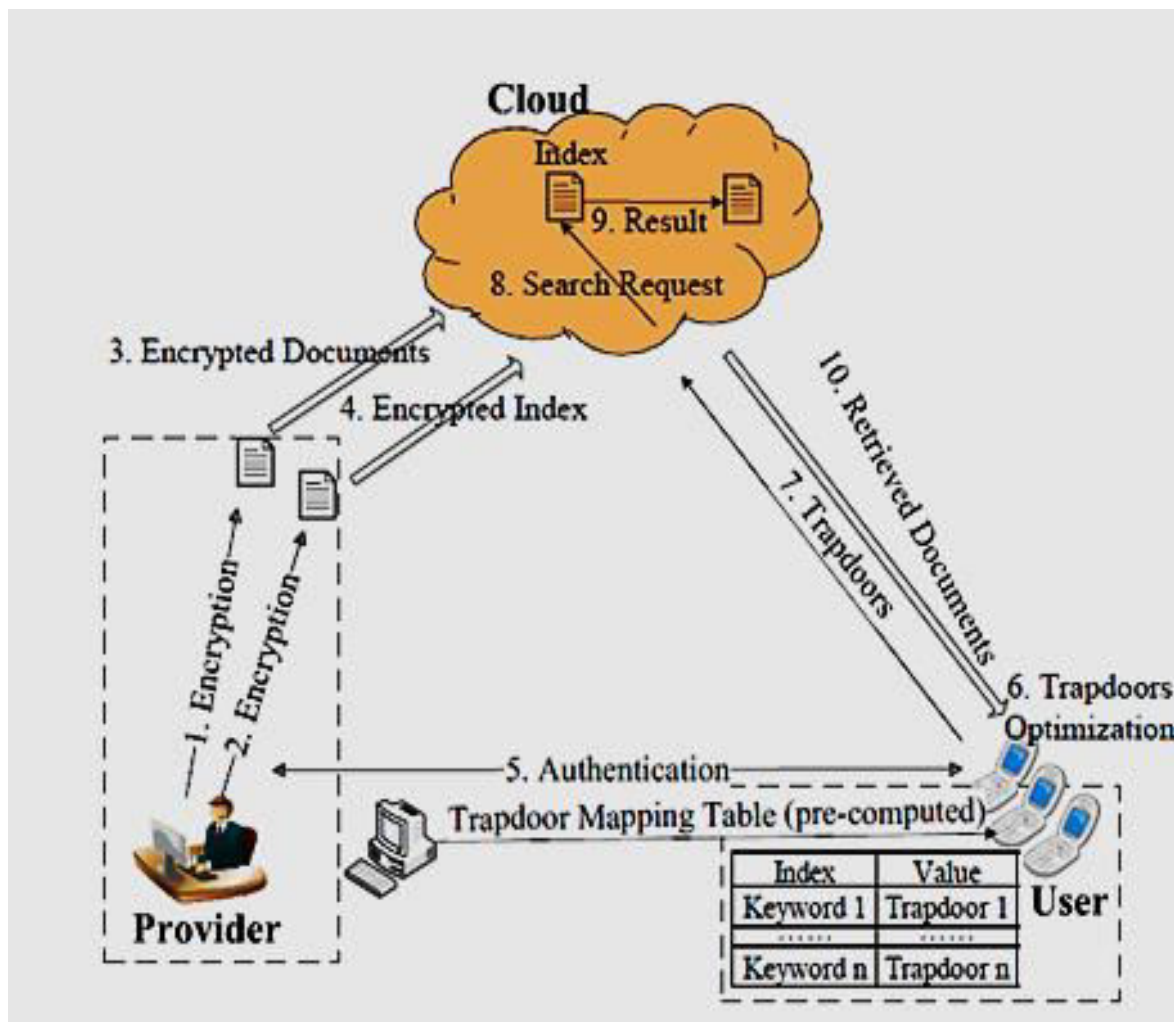
**Figure 2.3: Trapdoor generation in proposed system**

The calculation of the trapdoors is based on the frequency of the words in the document. The trapdoor calculation time graph is shown below in the figure 2.4.



**Figure 2.4: Trapdoor calculation time.**

In this paper in the proposed system as shown in the figure 2.5 the provider will encrypt the documents along with the index and keywords, here keywords are nothing but trapdoors



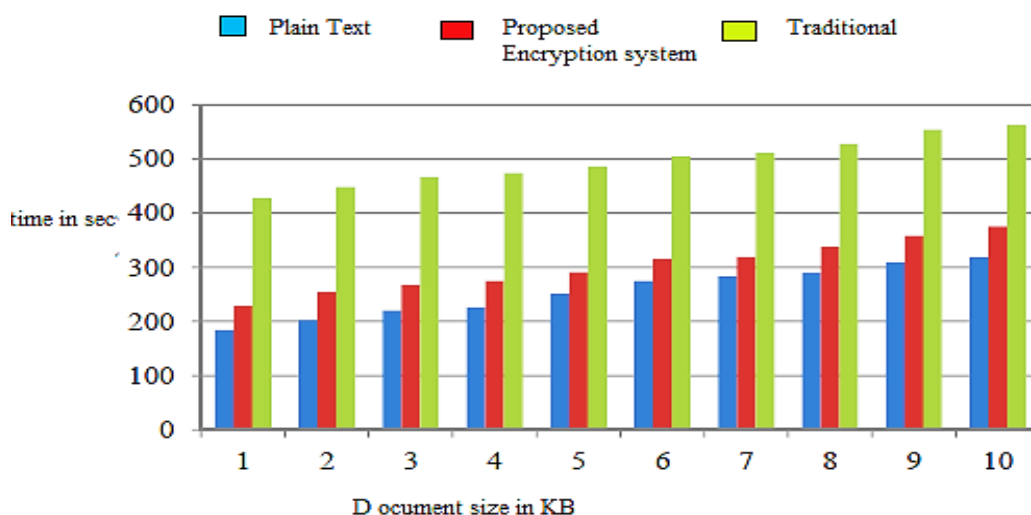
**Figure 2.5: Encrypted system with trapdoors**

And once when user requests for a particular document then the user has to register and after registration when he login that time the provider will send a authenticated key to the user, if user enters same authenticated key then he will be recognized as a valid user or else invalid.

If user enters valid credentials then the user can request a particular document from the server by providing a keyword of the document. When cloud server receives a keyword it sends that to a provider and provider gives the documents matching with the user keyword. Then the user can retrieve the documents from the cloud server by sending the trapdoors and cloud server will send a top k documents and user will choose and decrypt them using a private key sent by the provider. The advantages of proposed is reduced network traffic and delay in search due to the pre computed trapdoors and keywords.

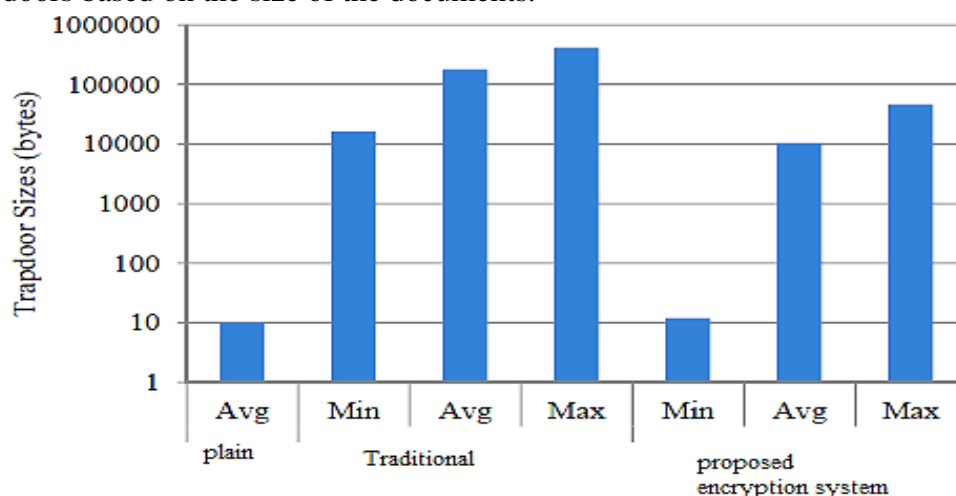
## 2. EXPERIMENTAL RESULTS

To evaluate the proposed system in the project we used a private cloud from our lab and virtual machine with 8G memory for the cloud. We also implemented the RSBS algorithm, which is written in a python language, to search and return the retrieved documents to the user, in faster rate there by reducing delay in search. The search time evaluation comparing with the different documents size is shown in the below graph.



**Figure 3.1: Performance Comparison In Search Time**

From the above figure our proposed encryption model saves about 47% of the time compared to Traditional text for 1 KB documents, and by 34% for 10KB documents. Notice that the search is not more than the plain text because here we are using a RSBS algorithm. Since here we are calculating trapdoors for each and every document we are storing in the cloud for that we are using a trapdoor compression method, and size of the trapdoors varies depending on the documents in the below graph we show the calculation of trapdoors based on the size of the documents.



**Figure 3.2: The Comparison of Trapdoor Sizes**



Once user sends the search request to the cloud by sending the trapdoors the cloud server removes the noise in the trapdoor the average length of the trapdoors noise is shown in the below graph.

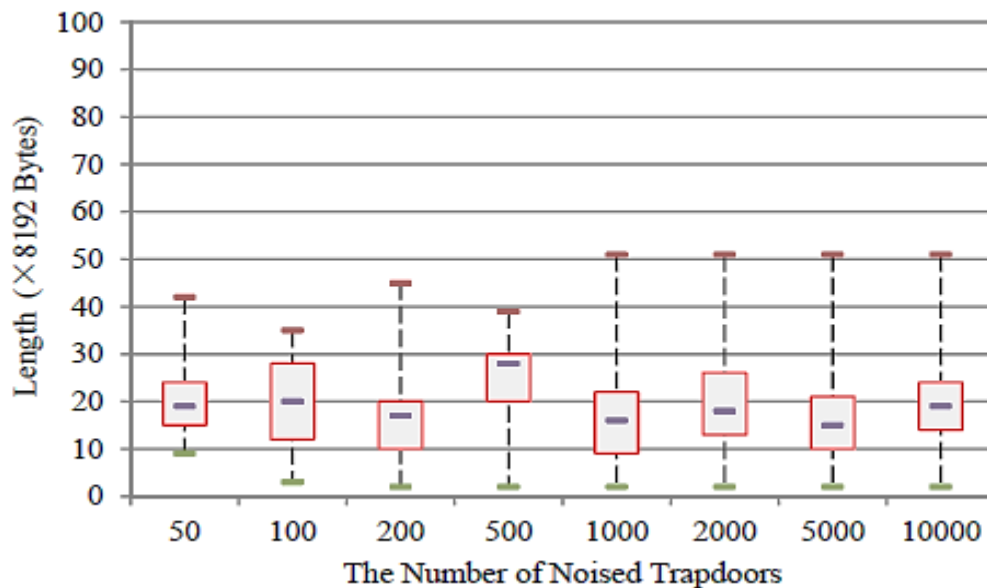


Figure 3.3: Average length of each noised trapdoor

There by performance in the proposed system is increased and decreased delay in the search since the computation of trapdoors and keywords and also by using trapdoors compression method like trapdoor mapping table and rank based serial binary search algorithm.

### 3. CONCLUSION

In this paper a novel encryption method has been proposed which enable decrease in search delay and improved efficiency of network traffic over the cloud compared to traditional system initially we analyzed a traditional systems and what are the bottlenecks for the traditional system and tried to solve some of those limitation by adopting a trapdoor compression method and RSBS algorithm(ranked serial binary search) these to enforced to a decreased cost and efficiency in the network traffic as well as decreased delay in search.

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# Partially Replacement Of Waste Toughen Glass As Fine Aggregate In Concrete

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## Abstract

Concrete is one of the most widely used construction material in the world. Glass is a major component of the solid waste stream in many countries. It is cheaper, it can be found in many forms, including container glass, Architectural curtain wall, glass door, vertical window, indoor - outdoor decoration, furniture, bathroom & guard railing etc. In this paper the fine aggregate were replaced by waste toughen glass as 5%, 15%, 25%, and 35% by weight for M-30 mix design. The concrete specimens were tested for compressive strength and the results obtained were compared with those of normal concrete. 25% replacement of fine aggregate by waste toughens glass showed 7% increase in compressive strength at 28 days. The particle size of ranges 0.6-2.36mm.

## 1. INTRODUCTION

Waste glass is a major component of the solid waste stream in many countries . It can be found in many forms, including container glass, Architectural curtain wall, glass door, vertical window, indoor- outdoor decoration, furniture ,bathroom & guard railing ,White Waste Toughen glass sheet cuttings collected from local Glass shops and construction areas is used. The Solid as well as

liquid waste management is one of the biggest problems of the whole world. The disposal of waste in to the land causes serious impact on environment. It spoils the land. It increases the need of precious land for dumping waste glass, It increasing the need to establish new expansive landfills. It also to reduce the river dredging problem. The uses of waste toughen glass as a fine aggregate in concrete has great potential for future high quality concrete development. However, deleterious alkali-silica reaction (ASR) might occur in glass concrete due to its high silica constituent. Some solutions have been formed to reduce effect of ASR, & increase the strength of concrete. Utilization of waste glass is very important for human development because huge amount of glass waste produce by human. The use of waste toughens glass in concrete with partially replacement of fine aggregate play a role as:-

- i.) To Increase the compressive strength of concrete.
- ii.) To reduce the total cost of project.
- iii.) To decrease use of natural sand.
- iv.) Give best of option to reuse waste glass in concrete.

## 2. CRUSHED WASTE TOUGHEN GLASS

Toughen glass also known as tempered glass is made by quickly cooling the annealed float glass when it is heated near to its softening point. After tempering uniform compression is formed over the surface while tensile stress formed inside the glass plate. thickness is vary from 10 to 50mm. It broken shatters into small and comparatively harmless pieces. It is claimed that the resistance to mechanical shock of toughened plate glass is 4 to 5 times more than that of ordinary plate glass. A toughened glass has better resistance to the vibration, mechanical shock and abrasion. The crushed toughen glass has used for project which has ranges passing through 2.36 mm IS sieve & retaining on 0.6 mm IS sieve.



Figure 1: Crushed Waste Toughen Glass

## 2.1 Properties of Waste Toughen Glass

### I. Physical Properties

Sr. No.	Properties	Content
1.	Specific gravity	2.6
2.	Fineness Passing 150 $\mu$ m	99.5
3.	Fineness Passing 90 $\mu$ m	98

### II. Chemical Properties

Sr. No.	Chemical Properties	% Of Mass
1.	SiO <sub>2</sub>	67.33
2.	Al <sub>2</sub> O <sub>3</sub>	2.62
3.	Fe <sub>2</sub> O <sub>3</sub>	1.42
4.	TiO <sub>2</sub>	0.157
5.	CaO	12.45
6.	MgO	2.75
7.	Na <sub>2</sub> O	12.05
8.	K <sub>2</sub> O	0.63

## 2.2 Terminology

It is necessary to be described the following terms related to the keyword used in this Present paper.

- i.) Cement: - The Portland pozzolanic Cement (PPC-43 grade) is used for entire project. The cement procured from local market. The Specific gravity of cement 3.15.
- ii.) Fine Aggregate: - Locally available river sand confirming to IS-383-197 specific gravity is 2.75.
- iii.) Coarse Aggregate:- Aggregate Passing through 20 mm sieve and retained on 10 mm Sieve by local quarry is used. Specific gravity is 3.09.
- iv.) Water: - ordinary potable Tap water is used entire project for curing purpose .& experimental investigation
- v.) Toughen glass: - White Waste Toughen glass sheet cuttings collected from local Glass shops and construction areas, automobiles are used.

## 3. METHODOLOGY

### a) Mix Proportioning

The mix proportion is done as per the IS 10262- 2009. The target mean strength is 38.25 MPA (M30) for the PPC control mixture, the total binder content is 492.5 kg/m<sup>3</sup>, fine aggregate is 782.5 kg/m<sup>3</sup>, and coarse aggregate 1119.56 kg/m<sup>3</sup>, for the water to binder ratio is 0.4. Casting concrete cubes having size 150 x150 x 150 mm. Compaction of concrete in three layers with 25 strokes of 16 mm rod for each layer. The concrete left in the mould and allow setting for 24 hours before the cubes de mould and place in curing tank. The concrete cubes cure in the tank for 7, and 28 days for compression test. After

curing cubes were tested by UTM .For replacement of fine aggregate by waste toughen glass at 5%, 15%, 25%, 35% total quantity of material required for preparing 24 cubes of having size 150x150x150 is, cement 39.84 kg ,fine aggregate 50.5 kg, coarse aggregate 90.48 kg, water 15.84 liter, toughen glass 12.63 kg.

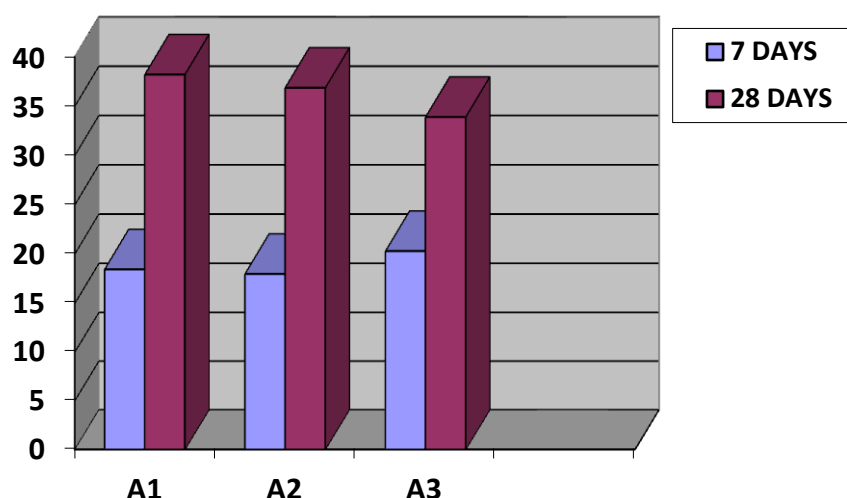
#### b) Compressive Strength

The Specimens were cast with concrete mixes mentioned and cure for 7 & 28 days in laboratory. On completion of curing period of 7 & 28 days, the specimens were taken out and were tested under a compression testing machine of 1000KN capacity. The crushing loads were noted and the average compressive strength of three specimens is determined. The tables in result represent the influence of curing age of compressive strength of glass concrete cubes.

### 4. RESULTS

**Table 1: Compressive strength of concrete after 7 days & 28 days for control mix**

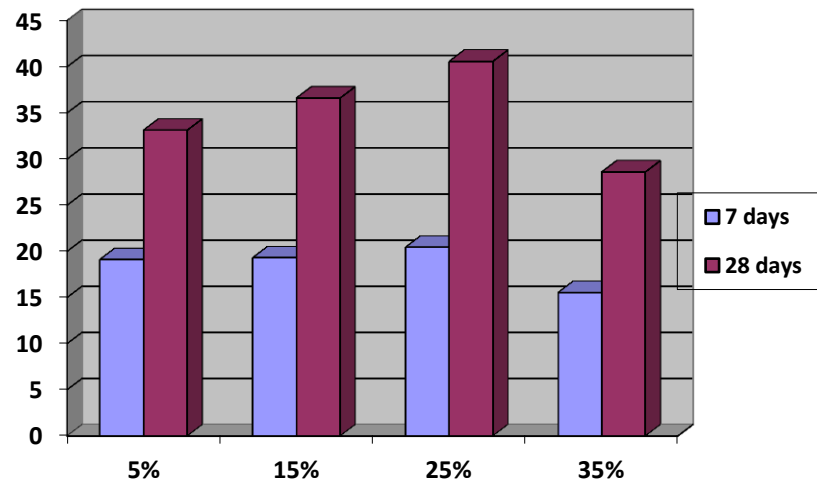
Sr. No.	Curing Days	Compressive Strength For 7 & 28 Days (N/Mm <sup>2</sup> )			Average Compressive Strength (N/mm <sup>2</sup> )
		I	II	III	
1	7	18.46	18.00	20.31	18.92
2	28	38.22	36.88	33.91	37.64



**Table 2: Compressive Strength of Glass Concrete after 7, & 28 days.**

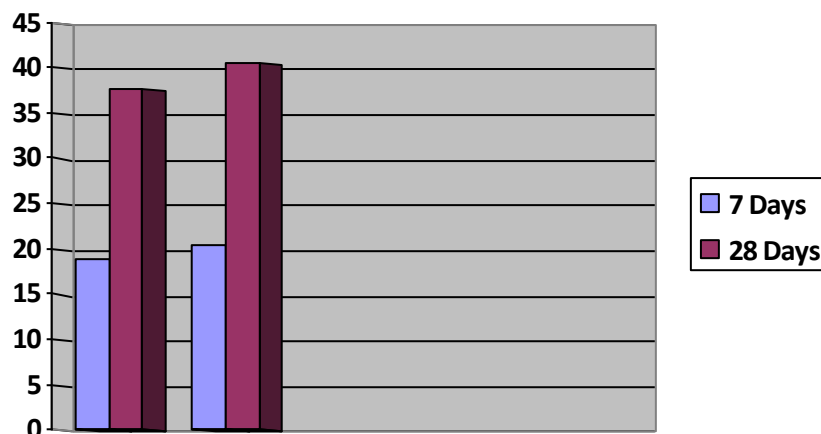
Sr. No.	% Of Replacement Of Toughen Glass	Compressive Strength N/Mm2	
		7 Days	28 Days
1	5%	19.10	33.12
2	15%	19.3	36.60
3	25%	20.43	40.57
4	35%	15.62	28.59





**Table 3: Comparison between compressive strength of Normal concrete & Glass Concrete**

Curing Days	Compressive Strength In N/Mm <sup>2</sup>	
	Normal Mix	By 25% Replacement
7 Days	18.92	20.43
28 Days	37.64	40.57



#### 4. CONCLUSION

- ▶▶ The partially replacement of fine sand by waste toughen glass of 5%, 15%, 25%, 35% gives best result (strength) at 25% replacement of fine sand by waste toughen glass.
- ▶▶ The strength of glass concrete has increased by 7% at 25% partially replacement of fine sand by waste toughen glass as compare to conventional concrete.
- ▶▶ In behaviour of glass concrete, it has observed that the crack width goes on increasing over the 25 % replacement of the waste toughen glass in concrete.
- ▶▶ The waste toughens glass using in concrete give best option for conventional sand.
- ▶▶ It reduces the amount of use of natural sand in concrete.
- ▶▶ It reduces the total cost of project.

- It is helpful to environment, to decrease the effect like river dredging & reduce land filling .

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# Design And Performance Evaluation Of Eight Element Array For Adaptive Antenna System And 4G (LTE) Applications

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<b>KeyWords</b>	<b>Long Term Evolution (LTE), Adaptive Antenna Array, LMS And RLS Algorithms, CST Microwave Studio</b>				

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## Abstract

*This paper presents the design of 8- element linear array for Adaptive Antenna applications. Conventional patch antenna is optimized to operate at 2.3GHz (4G applications) by using CST Microwave Studio parameterization. Design of array for 2.3GHz is investigated and presented which is compatible for Long Term Evolution (LTE) slandered. The S parameters, gain and VSWR of the antenna array are studied. The attempt has been made to improve the gain of adaptive array. We could achieve the gain for 8 element array 15.6dB. Simulation results are obtained using CST Microwave studio.*

## 1. INTRODUCTION

Adaptive array beam formers are a key component of communications due to their ability to improve the system capacity [1]. The benefit of using adaptive antenna array beam forming includes the improvement of the signal-to-interference plus- noise ratio (SINR),

directive gain and Bit Error Rate (BER). The term adaptive antenna is used for a phased array when the weighting on each element is applied in a dynamic fashion. The amount of weighting on each channel is not fixed at the time of the array design, but rather decided by the system at the time of processing the signals to meet required objectives. The antenna pattern in this case has a main beam pointed in desired direction and has null in the interference. Wireless communication is important part of human life where people can communicate everywhere and anywhere in the world with very high speed. Mobile communication technologies have moved forward from 1G, 2G, and 3G to now 3.5G, which is also known as Long Term Evolution (LTE). LTE was standardized by the 3rd Generation Partnership Project (3GPP) in order to satisfy the market demand [2]. LTE provides high data rates, which enables an exciting range of wireless communication services. LTE operates over different frequency bands from 400 MHz up to 4 GHz with bandwidth (BW) from 1.4 to 20 MHz.

In this paper we have proposed Adaptive antenna with 8 elements using CST microwave studio. Results are obtained for return loss, VSWR, and gain with single element, two elements, four elements, and eight elements. Then we fabricated same antenna as per our design and experimental results obtained are comparable with simulation results.

## 2. DESIGN OF ADAPTIVE ARRAY

This Adaptive antenna is an array of micro strip patches. The micro strip Patch antenna is a single-layer design which consists generally of four parts (patch, ground plane, substrate, and the feeding part). The advantages of the micro strip antennas are small size, low profile, and lightweight, conformable to planar and non-planar surfaces. To design patch antenna which will resonate at 2.3GHz, Rogers RT Duroid 5870 material is used as substrate. The Rogers RT 5870 has dielectric constant 2.33 and thickness (height) of 0.787mm. The first step [9, 14] is to calculate the length & width of patch antenna. This can be calculated using following equations.

1. For width

$$w = \frac{c}{2fr} \sqrt{\frac{2}{\epsilon_r + 1}}$$

Where,

$c = 3 \times 10^8$  m/sec

$fr$  is the resonant frequency,  $fr = 2.3$ GHz

$\epsilon_r$  is dielectric constant of FR4\_epoxy, 4.3

Therefore after putting value we get,

$$w = 40\text{mm}$$

2. Length:

- a. For finding length first find effective dielectric constant,

$$\epsilon_{eff} = \frac{\epsilon_r + 1}{2} + \frac{\epsilon_r - 1}{2} * \frac{1}{\sqrt{1 + \frac{12h}{w}}}$$

By putting value, we get

$$\epsilon_{eff} = 2.261$$

b. Find extended incremental length,

$$\Delta L = 0.412 * h \frac{(\epsilon_{eff} + 0.3)(\frac{W}{h} + 0.264)}{(\epsilon_{eff} + 0.258)(\frac{W}{h} + 0.8)}$$

After putting value we get,

$$\Delta L = 0.326mm$$

Now length of patch antenna,

$$L = \frac{c}{2fr\sqrt{\epsilon_r}} - 2 * \Delta L$$

After putting value we get,

$$L = 30mm$$

3. To calculate position of coaxial feed:

$$1. Xf = \frac{L}{\sqrt{\epsilon_{eff}}}$$

Where, Xf= Desire input impedance.

$\epsilon_{eff}$  – effective dielectric constant.

After putting value we get, Xf= 15mm

$$2. Yf = \frac{W}{2}$$

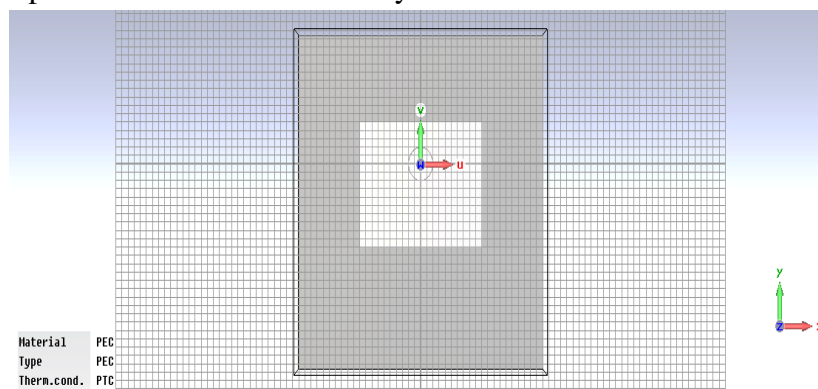
After putting values we get, Yf = 20mm

**Table 1: Dimensions of single element Antenna**

Parameters	Value	Description
W	40mm	Width of Patch
L	30mm	Length of Patch
T	0.07mm	Thickness of Patch(epoxy)
H	0.787mm	Height (or thickness) of FR4

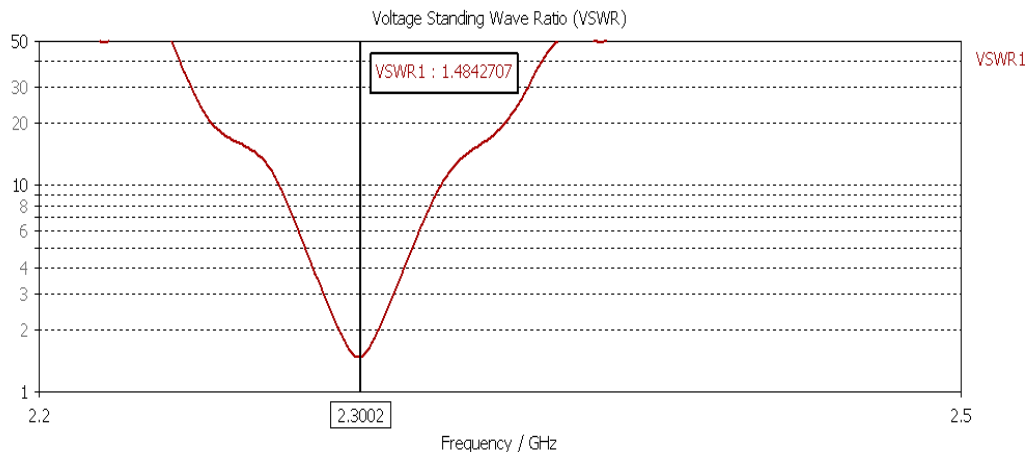
### 3. SIMULATION RESULTS

The optimized single element antenna is simulated as shown in fig.1. The VSWR plot, return loss and radiation pattern are shown in figure 2, 3, and 4 respectively. The VSWR at 2.3GHz is coming 1.48. The return loss for this frequency is 14.23dB. Gain is measured from radiation pattern and it is 6.13 dBi only.

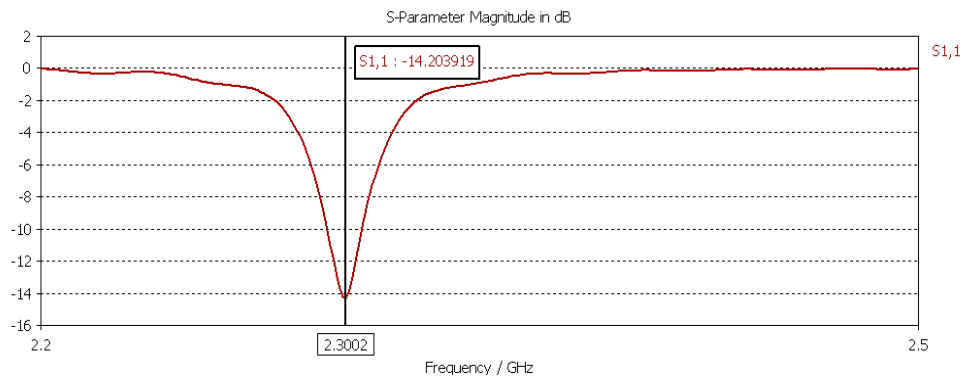


**Figure.1: Design of 1 element antenna**

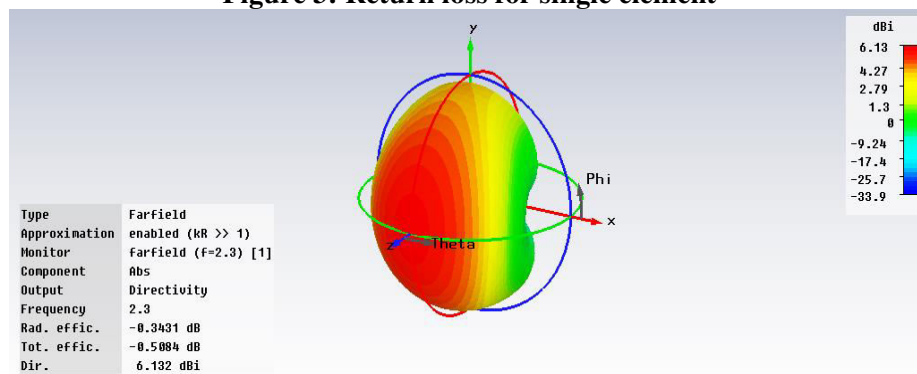




**Figure 2: VSWR for single element**

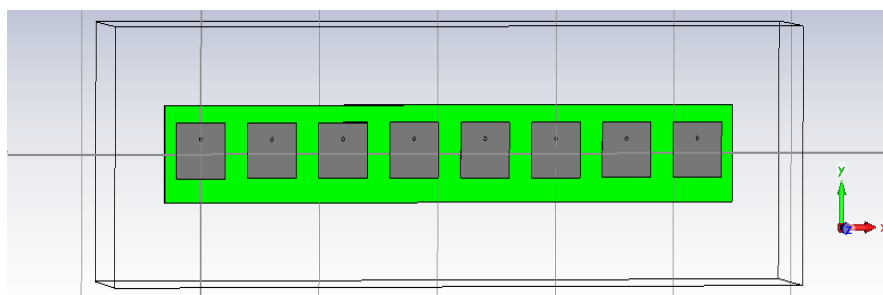


**Figure 3: Return loss for single element**

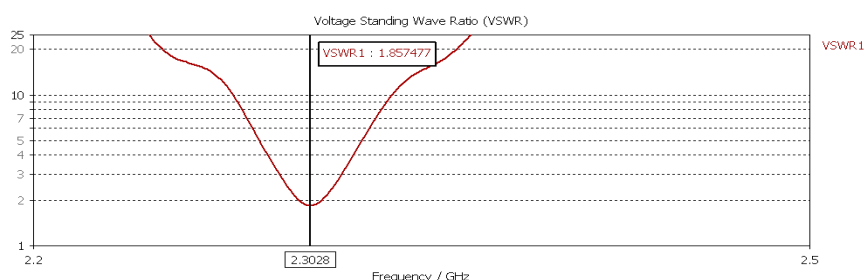


**Figure 4: Radiation pattern for single element**

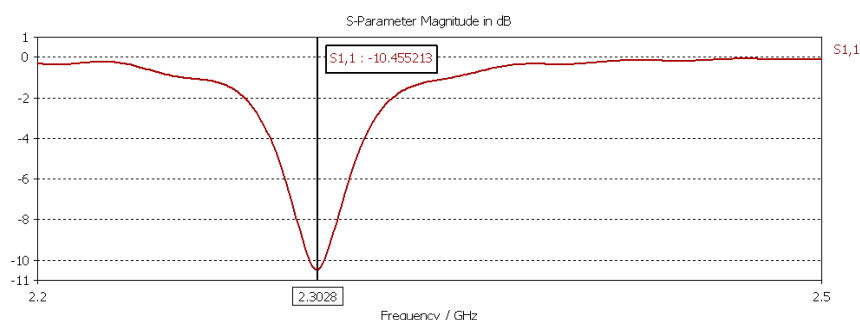
Once we get results for single element antenna, we have designed optimized array with two, four, and eight elements. The design of 8 element array is shown in figure 5. VSWR plot, return loss and radiation pattern for eight elements is shown in figure 6, 7, and 8 respectively. The comparison for all performance parameters is given in table 2. As we are going to increase no of elements gain is also increasing. Return loss and VSWR is also increasing with number of elements which is not desired but these values are acceptable.



**Figure 5: Design of 8 element array**



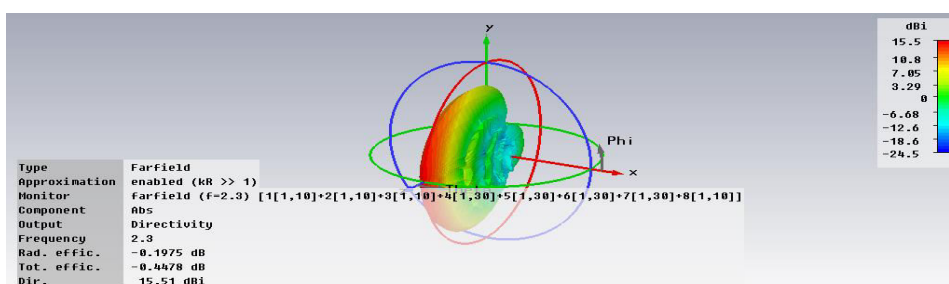
**Figure 6: VSWR of 8 elements**



**Figure 7: Return loss of 8 elements**

**Table 2: Comparison of performance parameters.**

Parameter	1 Element	2 Element	4 Element	8 Element
S11 Parameter	0.19	0.16	0.23	0.3
Return loss	-14.23	-15.47	-12.54	-10.44
VSWR	1.48	1.63	1.88	1.85
Gain	6.13db	9.7db	12.7db	23.6db



**Figure 8: Radiation pattern of 8 elements**

#### 4. HARDWARE DESIGN

After getting most appropriate simulation results for adaptive array we proceeded to fabricate eight elements array. Front side and back side of this array is as shown in figure 9 and 10 respectively. We also tested it for all parameters and thus we obtained almost comparable results with respect to simulation results.



**Figure 9: Front side of 8 element antenna array.**



**Figure 10: Back side of 8 element antenna array**

#### 5. CONCLUSION

An adaptive antenna array operating at 2.3GHz for LTE applications was proposed in this paper. The proposed antenna array gives high gain in desired direction and has an excellent gain. The incremented VSWR and return loss are also acceptable. Simulation results and experimental results are comparable. Therefore the presented results indicate that the proposed antenna array is efficient for 4G (LTE) applications.

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# A Study On The Usage Of ICT By Secondary School Teachers In Kurnool District

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<b>KeyWords</b>	ICT, Teaching And Learning, Effectiveness, Capabilities, ICT Applications, Student Centered Learning, Government And Private Secondary School Teachers,				

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## Abstract

*In recent days most of the secondary schools in government and private sector are equipped with computers and projectors in Kurnool district. i.e.) these are integral part of ICT and are used by teachers. The role of ICT in education is becoming more and more important and this importance will continue to grow and develop in the 21st century. ICT generally has a positive impact on teaching and learning situations. The adoption and use of ICTs in education have a positive impact on teaching, learning and performance of students. The purpose of this study is to analyze what is happening at schools regarding the integration and use of information and communication technologies (ICT) by teachers and to examine teacher's perceptions about what teaching and learning processes can be improved through the use of ICT. In this present study we want to bring out the variation among teachers in using ICT based on the variables like management, locality, medium of instruction, age, qualification, experience, and subject of teaching. The findings of this study revealed that all the teachers are having the same capability of using ICT.*



## 1. INTRODUCTION

The Ministry of Human Resource Development (MHRD), Government of India and the Indian Space Research Organization (ISRO) took a path breaking policy decision to launch a dedicated educational satellite, in which the use of ICTs can make substantial changes both in teaching and learning. According to Zhao and Cziko (2001) three conditions are necessary for teachers to introduce ICT into their classrooms: teachers should believe in the effectiveness of technology, teachers should believe that the use of technology will not cause any disturbances, and finally teachers should believe that they have control over technology. The use of ICT in education lends itself to more student-centered learning settings. ICT in education can help to improve memory retention, increase motivation and generally deepens understanding. It is also believed that the use of ICTs in education could promote deep learning and allow educators to respond better to different needs of different learners. The effective integration of technology into classroom practices poses a challenge to teachers and administrators. 21st century is the age of Information and Communication Technology. All over the globe, there is a trend to use ICT in the teaching learning process. Teachers in this sector are commonly faced a range of barriers that affect the use of ICT are dissatisfaction with the internet connection speed, requiring better technical maintenance and support of ICT within school, Teachers lacking sufficient computer skills and difficulty in finding adequate learning materials for teaching. The Information and Communication Technology (ICT) in Schools was launched in December, 2004 and revised in 2010 to provide opportunities to secondary stage students to mainly build their capacity on ICT skills and make them learn through computer aided learning process. The Information and Communication Technology (ICT) in schools have been subsumed in the Rashtriya Madhyamik Shiksha Abhiyan (RMSA). Now ICT in Schools is a component of the RMSA. To promote computer enabled learning and usage of ICT in teaching in Government and Government aided Secondary and Higher Secondary Schools has provision for instituting the **National Award for innovative use of ICT to motivate the Teachers and Teacher Educators** for innovative use of ICT in teaching-learning.

## 2. OBJECTIVES

- I. To study the ICT usage by secondary school teachers.
- II. To study the usage of ICT by secondary school teachers basing on their age, locality, qualification, gender, management, experience, medium and subject dealing.

## 3. HYPOTHESIS

- I. Usage of ICT changes due to their gender.
- II. Usage of ICT changes due to their profession.
- III. Usage of ICT changes due to their locality.
- IV. Usage of ICT changes due to their qualification.
- V. Usage of ICT changes due to their age.

- VI. Usage of ICT changes due to their teaching experience.
- VII. Usage of ICT changes due to their medium.
- VIII. Usage of ICT changes due to their subject.

#### 4. SAMPLE AND TOOL

A self-prepared tool was administered and standardized with five point rating scale containing answers 1,2,3,4 and 5 giving the score as same.

#### 5. ANALYSIS AND INTERPRETATION

**Research hypothesis 1:** ICT usage of government and private teachers are significant.

**Null hypothesis 1:** There is no significant difference between ICT usage of government and private teachers.

**Table1: Showing the significant difference between government and private secondary school teachers with respect to usage of ICT**

ICT dimension	Management	N	Mean	SD	t-value
Usage Of ICT	Government	115	8.03	1.70	0.9417
	Private	85	7.78	1.69	

Not significant at 0.05 & 0.01 level of significance. The null hypothesis is accepted.

**Research hypothesis 2:** ICT usage of rural and urban teachers is significant.

**Null hypothesis 2:** There is no significant difference between ICT usage of rural and urban teachers.

**Table 2: Showing the significant difference between rural and urban secondary school teachers with respect to usage of ICT**

ICT dimension	Locality	N	Mean	SD	t-value
Usage of ICT	Rural	110	8.06	1.60	0.8661
	Urban	90	7.86	1.79	

Not significant at 0.05 & 0.01 level of significance. The null hypothesis is accepted.

**Research hypothesis 3:** ICT usage of Telugu and English medium teachers is significant.

**Null hypothesis 3:** There is no significant difference between ICT usage of Telugu and English medium teachers.

**Table 3: Showing the significant difference between Telugu and English medium secondary school teachers with respect to usage of ICT**

ICT dimension	Medium	N	Mean	SD	t-value
Usage of ICT	Telugu	100	8.05	1.81	0.6688
	English	100	7.89	1.56	

Not significant at 0.05 & 0.01 level of significance. The null hypothesis is accepted.

**Research hypothesis 4:** ICT usage of below 35y and above 35y age teachers are significant.

**Null hypothesis 4:** There is no significant difference between ICT usage of below 35y and above 35y age teachers.

**Table4: Showing the significant difference between below 35y and above 35y secondary school teachers with respect to usage of ICT**

ICT dimension	Age	N	Mean	SD	t-value
Usage of ICT	Below 35	120	7.88	1.70	0.1103
	Above 35	80	7.85	1.61	

Not significant at 0.05 & 0.01 level of significance. The null hypothesis is accepted.

**Research hypothesis 5:** ICT usage of PG and UG qualified teachers are significant.

**Null hypothesis 5:** There is no significant difference between ICT usage of PG and UG qualified teachers.

**Table5: Showing the significant difference between PG and UG qualified secondary school teachers with respect to usage of ICT**

ICT dimension	Qualification	N	Mean	SD	t-value
Usage of ICT	PG	50	7.84	1.85	0.5565
	UG	150	8.01	1.65	

Not significant at 0.05 & 0.01 level of significance. The null hypothesis is accepted.

**Research hypothesis 6:** ICT usage of B.Ed. and M.Ed. qualified teachers are significant.

**Null hypothesis 6:** There is no significant difference between ICT usage of B.Ed. and M.Ed. qualified teachers.

**Table 6: Showing the significant difference between B.Ed. and M.Ed. qualified secondary school teachers with respect to usage of ICT**

ICT dimension	Professional qualification	N	Mean	SD	t-value
Usage of ICT	B.Ed.	191	7.98	1.69	0.3486
	M.Ed.	9	7.78	1.72	

Not significant at 0.05 & 0.01 level of significance. The null hypothesis is accepted.

**Research hypothesis 7:** ICT usage of below 5y and above 5y experience teachers is significant

**Null hypothesis 7:** There is no significant difference between ICT usage of below 5y and above 5y experience teachers.

**Table7: Showing the significant difference between below 5y and above 5y experience secondary school teachers with respect to usage of ICT**

ICT dimension	Experience	N	Mean	SD	t-value
Usage of ICT	Below 5years	80	7.88	1.59	0.6803
	Above 5years	120	8.05	1.81	

Not significant at 0.05 & 0.01 level of significance. The null hypothesis is accepted.

**Research hypothesis 8:** ICT usage of arts and science teachers are significant.

**Null hypothesis 8:** There is no significant difference between ICT usage of arts and science teachers.

**Table8: Showing the significant difference between arts and science teaching secondary school teachers with respect to usage of ICT**

ICT dimension	Subject	N	Mean	SD	t-value
Usage of ICT	Arts	110	7.88	1.70	-1.5427
	Science	90	8.38	1.76	

Not significant at 0.05 & 0.01 level of significance. The null hypothesis is accepted.

## 6. FINDINGS FROM THE PRESENT STUDY

- i.) There is no significant difference between usage of ICT of government and private teachers in Kurnool district.
- ii.) There is no significant difference between usage of ICT of rural and urban teachers in Kurnool district.
- iii.) There is no significant difference between usage of ICT of telugu and English medium teachers in Kurnool district.
- iv.) There is no significant difference between usage of ICT of below 35y and above 35y age teachers in Kurnool district.
- v.) There is no significant difference between usage of ICT of PG and UG qualified teachers in Kurnool district.
- vi.) There is no significant difference between usage of ICT of B.Ed. and M.Ed. qualified teachers in Kurnool district.
- vii.) There is no significant difference between usage of ICT of below 5y and above 5y experience teachers in Kurnool district.
- viii.) There is no significant difference between usage of ICT of arts and science teachers in Kurnool district.

## 7. CONCLUSSIONS

- i.) Usage of ICT of secondary school teachers in Kurnool district are not changes due to their management i.e.) government and private teachers have same efficiency in usage of ICT.
- ii.) Usage of ICT of secondary school teachers in Kurnool district are not changes due to their locality i.e.) rural and urban teachers have same efficiency in usage of ICT.
- iii.) Usage of ICT of secondary school teachers in Kurnool district are not changes due to their medium of instruction i.e.) telugu and English medium teachers have same efficiency in usage of ICT.
- iv.) Usage of ICT of secondary school teachers in Kurnool district are not changes due to their age i.e.) below 35y and above 35y age teachers have same efficiency in usage of ICT.
- v.) Usage of ICT of secondary school teachers in Kurnool district are not changes due to their qualification i.e.) PG and UG qualified teachers have same efficiency in usage of ICT.



- vi.) Usage of ICT of secondary school teachers in Kurnool district are not changes due to their professional qualification i.e.) B.ED. M.ED. qualified teachers have same efficiency in usage of ICT.
- vii.) Usage of ICT of secondary school teachers in Kurnool district are not changes due to their experience i.e.) below 5y and above 5y experience teachers have same efficiency in usage of ICT.
- viii.) Usage of ICT of secondary school teachers in Kurnool district are not changes due to their subject teaching i.e.) arts and science teachers have same efficiency in usage of ICT.

## 8. SUGGESSTIONS

- i.) Special ICT classes are compulsory for male and female teachers to enhance their skills to the latest technologies.
- ii.) Science and maths teachers are always having high usage skills than arts and language teachers. What are the reasons behind for this aspect? The further studies on this will make all teachers as best teachers.
- iii.) Majority of the teachers are not used computers for teaching-learning process sufficiently due to lack of time and burden of syllabus.
- iv.) If all the teachers are familiar with the software then they will able to assess the student's performances easily.
- v.) A small percentage of schools achieved high levels of effective use of ICT to support and change the teaching and learning process in many subject areas.
- vi.) The studies which tried to establish a link between the use of ICT and students' results in exams are very important for further quality education in levels.
- vii.) ICT has positive impact on students' performances in secondary schools particularly in science and less in arts. Schools with higher level of e-maturity show a rapid increase in performances in scores compared to those with lower level.

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# Cognitive Styles Of Student Teachers

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<b>KeyWords</b>	Cognition, Cognitive Style Inventory , Descriptive Survey Method, Gender, Locality, Educational Qualification, Type Of Family Annual Income , Subjects, 75 Student Teachers, Education Colleges, Coimbatore				

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## Abstract

*The chief objective of the present study is to profile the cognitive styles of student teachers. It is based on data collected from 75 student teachers studying from colleges of education. Simple random sampling technique has been used to collect the sample. The Cognitive Style Inventory (CSI) has been used as tool to collect the data. Results indicate that the student teachers possess three types of cognitive styles, namely, split cognitive style, systematic cognitive style and integrated cognitive style. It has also been found that there exists association in cognitive styles of teachers based on variation in their gender.*

## 1. INTRODUCTION

The concept Cognitive Style that individual consistently exhibit stylistic preferences for the ways in which they organize stimuli and construct meanings for themselves out of their experiences. It has become a popular theory of perception, intellect and personality. It is described as a personality dimension which influences attitudes, values and social interaction. It is need-based. Paivio (1971) indicated that cognitive style assesses whether an individual tends to think in verbal terms, using sequential processing of information, or in visual terms, using parallel processing. Cornett (1983) described cognitive style as a predictable pattern of behaviour within a range of individual variability. Messick (1984) indicated that cognitive style deals with the manner in which people prefer to make sense out of their world by collecting, analyzing, evaluating, and interpreting data. Srinivas

Kumar (2011) defined that cognitive style has to be considered as a holistic process of cognition that begins with the perception, and mediated by information processing, and the resultant retrieval; it varies from person to person and it is affected by various personality factors, such as, previous information, heredity and environment, interest, thinking, attitude, value system, intelligence, creativity, social and economic status and so on.

The Nature of an Individual varies from one other especially in ways of perception; understanding and retrieval processes become an important focus for the cognitive style differences. Teachers form significant portion of the human population who has an aim in building citizenry for the country. They are the torchbearers for any nation. Their role is crucial as transmitters of culture to the new members of the society and they are also dynamic participants in social change. The 'cognition' is incidental and the 'learning' is goal-directed (Srinivas Kumar, 2013). These are complementary to each other. Hence, an attempt is made in the present study to prepare a profile of cognitive styles of student teachers for facilitating better learning for them. Probably, by finding the cognitive styles, the perceptions, ways of information processing, retrieval etc., of student teachers could be gauged. This kind of exploration would help in understanding, presumably, the styles of the student teachers. In view these aspects, the objectives of the present study are stated as under.

## **2. OBJECTIVES**

- I. To find out the types of cognitive styles that exists among student teachers
- II. To find out the kinds of cognitive styles that are available among student teachers due to variation in their gender, locality, educational qualification, type of family, Annual income and subjects.

## **3. HYPOTHESES**

- I. There is no significant Association in the type of cognitive styles that exist among the student teachers due to variation in their gender.
- II. There is no significant Association in the type of cognitive styles among the student teachers due to variation in their locality.
- III. There is no significant Association in the type of cognitive styles among the student teachers due to variation in their educational qualification.
- IV. There is no significant Association in the type of cognitive styles among the student teachers due to variation in their type of family types.
- V. There is no significant Association in the type of cognitive styles among the student teachers due to variation in their Annual income.
- VI. There is no significant Association in the type of cognitive styles among the student teachers due to variation in their subjects.

#### 4. METHODOLOGY

Descriptive survey method has been used in the present study to explain the cognitive styles that exist among student teachers. The 'simple random sampling technique' has been used for selection of sample of 75 student teachers studying in colleges of education located in Coimbatore district of Tamilnadu State.

The Cognitive Styles Inventory (CSI) has been used as a tool in this investigation. The CSI is standardized for Indian population by Praveen Kumar Jha (2001). It is a self-report inventory of the ways of thinking, judging, remembering, storing information, decision making, and believing in interpersonal relationships. The CSI comprises 40 statements from which 20 statements are related to Systematic Style and the other 20 statements to Intuitive Style and are to be responded on five-point scale running from 'Strongly Agree' to 'Strongly Disagree' with three middle responses of 'Agree', 'Undecided', and 'Disagree'. It enables to assess the five styles, namely, systematic style, intuitive style, integrated style, undifferentiated style, and split style.

- A. **Systematic Style:** An individual who typically operates with a systematic style uses a well-defined step-by-step approach while solving a problem; looks for an overall method or pragmatic approach; and then makes holistic plan for problem solving.
- B. **Intuitive Style:** An individual with intuitive style uses an unpredictable ordering of analytical steps when solving a problem, depends on experience pattern characterized by universalized areas or hunches and explores and abandons alternatives quickly.
- C. **Integrated Style:** A person with an integrated style is able to change styles quickly and easily. Such style changes seem to be unconscious and take place in a matter of seconds. The result of this 'rapid fire' ability is that it appears to generate energy and a proactive approach to problem-solving. In fact, integrated people are often referred to as 'problem-seekers' because they consistently attempt to identify potential problems as well as opportunities in order to find better ways of doing things.
- D. **Undifferentiated Style:** A person with such style appears not to distinguish or differentiate between the two style extremes, that is, systematic and intuitive, and therefore, appears not to display a style. In a problem-solving situation, he/she looks for instructions or guidelines from outside sources. Undifferentiated individuals tend to be withdrawn, passive and reflective and often look to others for problem-solving strategies.
- E. **Split Style:** A person with split style shows fairly equal degrees of systematic and intuitive characteristics. However, persons with split-style do not possess an integrated behavioral response; instead they exhibit each separate dimension in completely different settings using only one style at a time based on the nature of the tasks. In other words, they consciously respond to problem-solving by selecting the most appropriate style.

## 5. RESULTS AND DISCUSSION

Upon analyses of the data gathered from the said sample of student teachers, it is noticed that there exist in a major style that is given in the following table.

**Table 1: Showing the Types of cognitive styles that exist among student teachers.**

Types of Cognitive styles	Split style	Systematic style	Integrated style	Undifferentiated style	Intuitive style
N = (75)	36	18	15	05	01
%	48%	24%	20%	06%	02%

Further, the following results have been obtained in respect of cognitive styles, in terms of Systematic Style, Intuitive Style, Integrated Style, Un-differentiated Style, and Split Style, due to variation in gender, locality, type of family, Educational qualification Annual Income and their Subjects. Chi-square test has been applied for testing the hypotheses set for the study.

**Hypothesis-1:** There is no significant Association in the type of cognitive styles that exist among the student teachers due to variation in their gender.

**Table 2: Showing the chi-square test value for the cognitive styles among student teachers (N=75) due to variation in their gender.**

Gender	N	Systematic style	Intuitive style	Integrated style	Undifferentiated style	Split style	Chi-square test value
Male	40	15 (4.66)	0 (0)	7 (8)	3 (2.7)	15 (19.2)	9.978*
Female	35	3 (8.4)	1 (0.5)	8 (7.0)	2 (2.3)	21 (16.8)	

The table value is 9.49 at 0.05 level for df=4.

\* Significant at 0.05 level.

The obtained chi-square test value (9.978) is greater than the table value (9.49) at 0.05 level and hence, the null-hypothesis is rejected. There is a significant Association between cognitive styles among the student teachers due to variation in their gender. Both male and female student teachers prefer split cognitive style.

**Hypothesis-2:** There is no significant Association in the type of cognitive styles that exist among the student teachers due to variation in their locality.

**Table 3: Showing the chi-square test value for the cognitive styles among student teachers (N=75) due to variation in their locality.**

Locality	N	Systematic style	Intuitive style	Integrated style	Undifferentiated style	Split style	Chi-square test value
Rural	57	16 (13.7)	0 (0)	11 (11.4)	3 (3.8)	27 (27.4)	5.586**
Urban	18	2 (4.3)	1 (0.5)	4 (3.6)	2 (1.2)	9 (8.6)	

The table value is 9.49 at 0.05 level for df=4.

\* Significant at 0.05 level.

The obtained chi-square test value (5.586) is lesser than the table value (9.49) at



0.05 level and hence, the null-hypothesis is accepted. There is no significant Association between cognitive styles among the student teachers due to variation in their locality. Both rural and urban student teachers prefer split cognitive style.

**Hypothesis-3:** There is no significant Association in the type of cognitive styles that exist among the student teachers due to variation in their educational qualification.

**Table 4: Showing the chi-square test value for the cognitive styles among student teachers (N=75) due to variation in their educational qualification.**

Edu. Qualification	N	Systematic style	Intuitive style	Integrated style	Undifferentiated style	Split style	Chi-square test value
UG	41	6 (9.8)	0 (0)	10 (8.2)	4 (2.7)	21 (19.7)	6.873**
PG	34	12 (8.2)	1 (0.5)	5 (6.8)	1 (2.3)	15 (16.3)	

The table value is 9.49 at 0.05 level for df=4.

\*\* Not Significant at 0.05 level.

The obtained chi-square test value (6.873) is lesser than the table value (9.49) at 0.05 level and hence, the null-hypothesis is accepted. There is no significant Association between cognitive styles among the student teachers due to variation in their educational qualification. Both UG and PG qualified student teachers prefer split cognitive style.

**Hypothesis-4:** There is no significant Association in the type of cognitive styles that exist among the student teachers due to variation in their type of family.

**Table 5: Showing the chi-square test value for the cognitive styles among student teachers (N=75) due to variation in their type of family.**

Type of family	N	Systematic style	Intuitive style	Integrated style	Undifferentiated style	Split style	Chi-square test value
Nuclear	44	10 (10.6)	0 (0)	8 (8.8)	4 (2.9)	22 (21.1)	2.694**
Joint	31	8 (7.4)	1 (0.5)	7 (6.2)	1 (2.1)	14 (14.9)	

The table value is 9.49 at 0.05 level for df=4.

\*\* Not Significant at 0.05 level.

The obtained chi-square test value (2.694) is lesser than the table value (9.49) at 0.05 level and hence, the null-hypothesis is accepted. There is no significant Association between cognitive styles among the student teachers due to variation in their type of family. Both nuclear and joint student teachers prefer split cognitive style.

**Hypothesis-5:** There is no significant Association in the type of cognitive styles that exist among the student teachers due to variation in their Annual Income.

**Table 6: Showing the chi-square test value for the cognitive styles among student teachers (N=75) due to variation in their annual income.**



Annual Income	N	Systematic style	Intuitive style	Integrated style	Undifferentiated style	Split style	Chi-square test value
Below 1 Lakh	55	13 (13.2)	0 (0)	10 (11.0)	4 (3.7)	27 (26.4)	2.563**
1 to 2 Lakh	17	4 (4.1)	1 (0.5)	5 (3.4)	1 (1.1)	7 (8.2)	
Above 2 Lakh	3	1	0	0	0	2	

The table value is 15.507 at 0.05 level for df=8.

\*\* Not Significant at 0.05 level.

The obtained chi-square test value (2.563) is lesser than the table value (15.507) at 0.05 level and hence, the null-hypothesis is accepted. There is no any significant Association between cognitive styles among the student teachers due to variation in their Annual Income. All income category student teachers prefer split cognitive style.

**Hypothesis-6:** There is no any significant Association in the type of cognitive styles that exist among the student teachers due to variation in their subjects.

**Table 7: Showing the chi-square test value for the cognitive styles among student teachers (N=75) due to variation in their subjects.**

Subject	N	Systematic style	Intuitive style	Integrated style	Undifferentiated style	Split style	Chi-square test value
Tamil	4	1	0	1	0	2	24.741**
English	14	1	0	0	0	13	
Maths	22	5	1	6	2	8	
Phy.Science	17	6	0	4	1	6	
Bio.Science	7	1	0	3	1	2	
Commerce	7	3	0	1	0	3	
History	4	1	0	0	1	2	

The table value is 36.415 at 0.05 level for df=24.

\*\* Not Significant at 0.05 level.

The obtained chi-square test value (24.741) is lesser than the table value (36.415) at 0.05 level and hence, the null-hypothesis is accepted. There is no any significant Association between cognitive styles among the student teachers due to variation in their subjects. The Tamil, English, Maths, and History subject student teachers are prefer split style. Whereas, student teachers from Physical science and Commerce subject are prefer both systematic and split style and Bio-science subject student teachers are prefer integrated cognitive style.

## 6. CONCLUSION

The present investigation has instructive results. It has been found that the student teachers studying in college of education possess three cognitive styles in a major way, namely, a major style that the Split Cognitive Style (36 out of 75 (48%)) followed by the Systematic Cognitive Style (18 out of 75 (24%)), and the Integrated Cognitive Style (15 out of 75

(20%)) among student teachers. It is dramatic that very minor portion of them appears to possess Undifferentiated Cognitive Style (5 out of 75 (06%) and Intuitive Cognitive Style category. Conceptually, split cognitive style is a combination of intuitive and systematic style. This feature points towards their ability to perceive and operate in a situation-based manner either systematic or intuitive; however, integrated style is not a part of the split-style. Results revealed that the next major portion of student teachers have the Systematic Cognitive Style. It is indicative of their ability to change the styles very rapidly from split to systematic. The third large segment of sample of student teachers has fallen under the category of Integrated Cognitive Style. Presumably, such a result has appeared for some other significant factors like their thought processes, interests, value-system, attitudes, problem solving ability and inhibitions etc., that which have a bearing on the cognitive style of an individual.

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# Effective Method of Awareness Creation in Removing Non-Eco-Friendly Practices

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## Abstract

*Many organizations do their business without any concern over environment. Stiff competition and government policy make them turn into eco-friendliness. This study attempts to find the effective ways to create awareness among the consumers towards eradication of non-eco-friendly practices. It comprises of awareness campaigns and slogans through media, social networks, conferences, seminars and awareness rallies. This could be done by the central and state governments, corporate, NGOs, and educational institutions. Consequently, eco-friendly practices create changes in the minds of consumers and proceed towards the safety of environment.*

## 1. INTRODUCTION

The environmental issues have become an increasingly public concern. Issues of global warming and climate change have come to the forefront. So the green movement has been expanding rapidly in worldwide. In this regard, consumers are taking responsibility and doing the right things. Consumer awareness and motivation continue to drive change in the marketplace – notably through the introduction and using of eco-friendly packaging. Though the Indian consumers are less awareness on eco-friendly practices, green is slowly and steadily becoming the symbolic color of eco-consciousness in India. The present non-biodegradable waste generated mostly by plastic packaging, especially in the form of small sachet is alarming (IIPM, 2008). Eco-friendly packaging is very important for businesses to fulfill the responsibility towards environment. It necessitates undertaking

various awareness methods to eradicate non-eco-friendly practices. This is in the hands of government through policies, eco-friendly campaigns by local bodies and NGOs. Besides, advertisements in newspapers, television, radio and social networks can also be made in this regard. Implementation of corporate social schemes is necessary to lead environment friendly activities. Conferences and seminars are to be conducted at the educational institution level to create awareness among the public to overcome the impact of non-biodegradable packaging. In fact, effective environment slogans create awareness among the consumers to know about the positive aspects of eco-friendly practices. Nowadays, more innovative ideas spread across the world to eradicate the impact of packaging which is harmful to the environment. In order to overcome the negative impacts of eco-friendly practices, banning and distribution of plastic packaging, recycling of plastics, using of eco-friendly packaging, reusing/refilling of packaging, avoidance of earlier disposal, avoidance of over packaging and conservation of resources by reuse/reduce/and recycle are some of the measures to be undertaken by the respective authorities (Anthony, 2003). By and large, it can be recommended that various campaigns need to be organized in order to mobilize the public and other stakeholders like government agencies, religious institutions, youth and women associations and media against indiscriminate use and disposal of plastic bags in order to minimize the excessive accumulation of plastic bag wastes in the environment (Annamalai.S, 2013). Indeed passing legislations alone not sufficient to curb the problem of plastic bag wastes. Therefore the government in collaboration with the concerned authorities should encourage consumers to use environment-friendly alternative materials, such as cloth bags, paper bags and natural fiber bags (D'Souza et al., 2006).

The study aims to identify the effective method of creating awareness among the consumers to discard non-eco-friendly practices. For this purpose, the primary data were collected in four taluks of Tuticorin district namely Tuticorin, Kovilpatti, Sathankulam and Ettayapuram. By applying convenience sampling method data were collected from 604 respondents in the study area. It consists of students, graduates, post-graduates, professionals, government employees, private employees and others. Statistical tools of ANOVA, chi-square test and Factor analysis were used with help of SPSS.

## **2. CONSUMER AWARENESS ON NON ECO-FRIENDLINESS**

Consumers are exposed daily to messages encouraging them to promote eco-friendly packaging. In spite of this encouragement and awareness of environmental issues, many consumers do not adopt environmentally friendly practices. This is done in burning of plastic waste, throwing away non bio-degradable plastic carry bags in the street and the like. Clean environment will improve public health. Effective campaign with regard to negative impact of non-eco-friendly practices should be done at the school, college and university levels to take the message to every household for the safety of the environment (Raju.K, 2012).

In order to analyse awareness among the consumers on eco-friendly practices especially packaging, ten factor solutions are applied by using SPSS 17.0. The Kaiser-Meyer-Olkin is applied to test sampling adequacy to run factor analysis.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.738
Bartlett's Test of Sphericity	Approx. Chi-Square	1961.540
	Df	45
	Sig.	.000

Kaiser-Major-Olkin exceeding 0.5 indicates factor analysis is appropriate. In this study the KMO measure of sampling adequacy given value 0.738, which is more than enough for applying factor analysis technique. There are ten variables thrown to analyse awareness on eco-friendly packaging. They are named as: V1: Government's ban on plastics, V2: Government's campaign towards the importance of green environment, V3: Local bodies' awareness rally and slogans, V4: Newspapers, V5: TV and Radio and NGO's, V6: Social Networks, V7: Friends and Relatives, V8: Teachers, V9: Conferences and Seminars, and V10: Corporate social development schemes. The rotated factor matrix for the variables relating to the creation of awareness on eco-friendly packaging is given below:

**Table 1: Awareness on Eco-friendly Packaging - Factor Analysis**

Variables	Factors			
	F1	F2	F3	Comm.
V.1	.909			.827
V.3	.867			.775
V.2	.857			.818
V.9		.805		.652
V.8		.775		.623
V.10		.773		.600
V.6		.506		.485
V.4			.719	.634
V.7			.701	.521
V.5			.663	.441
E.V	3.269	1.907	1.201	6.377
% of V	32.691	19.073	12.007	63.771
C.A	.874	.720	.604	2.198

An exploratory principal component analysis was used to extract the factors. The determined Eigen value greater than one was the extracted variables for the factors. The variances extracted by the factors are called the eigen values. The eigen values and the "Total Variance Explained" on the factors were successively extracted. The values are expressed as a percentage of the total variance. i.e., Factor 1 holds the value of 32.691 percentage of the total variance and Factor 2 holds the value of 19.073 percentage and so on. The sum of the eigen values is equal to the number of variables which contain the



cumulative variance of 63.771 percent. The range of communalities of ten items varies from 0.441 to 0.827 indicating that a large amount of variance has been extracted by the factor solution. The Cronbach alpha values are detected as greater than 0.60 for the Factors. The Cronbach alpha internal consistency reliability estimates Factor1 through Factor 3 are 0.874, 0.720, and 0.604 respectively. The overall perception scale is 2.198 which indicate its high reliability. The major factors which determine the creation of awareness on eco-friendly packaging to the customers are discussed below:

➤ **Campaign:**

Factor one describes the awareness on eco-friendly packaging to consumers created through various campaigns conducted by government and other organizations. It consists of government's ban on plastics (V1), local bodies' awareness rally and slogans (V3), and government's campaign towards the importance of green environment (V2).

➤ **Conferences:**

The conference which is rotated as factor 2 includes conferences and seminars (V9), teachers (V8), corporate social development schemes (V10) and social networks (V6) to create awareness on eco-friendly packaging.

➤ **Media:**

Factor three is named as Media which covers newspapers (V4), friends and relatives (V7) and TV, Radios and NGO's (V5). Among the rotated variables meant for making awareness on eco-friendly packaging, a variable of government's ban on plastics is identified as paramount in deciding it.

**Table 2: Government Ban on Plastics – Education wise Analysis**

Opinion Education	SD	D	UD	A	SA	Total
School Level	1 (0.3)	15 (4.2)	10 (2.8)	294 (81.4)	41 (11.4)	361 (100)
Graduate	1 (1.0)	2 (1.9)	4 (3.8)	65 (61.9)	33 (31.4)	105 (100)
Post-Graduate	0	1 (1.7)	2 (3.3)	33 (55.0)	24 (40.0)	60 (100)
Illiterates	0	2 (5.7)	3 (8.6)	26 (74.3)	4 (11.4)	35 (100)
Others	0	2 (4.7)	3 (7.0)	27 (62.8)	11 (25.6)	43 (100)
<b>Total</b>	2 (0.3)	22 (3.6)	22 (3.6)	445 (73.7)	113 (18.7)	604 (100)

Source: Primary Data. Figures in brackets indicate percentage

The analysis of educational qualification of the respondents and the way in which they aware on eco-friendly packaging indicates that about 81.4 percent of the respondents whose education is at school level aware on eco-friendly packaging created through government's ban on plastics. More than 61 percent of the graduates are also agreed the

same. This is 55 percent in case of post-graduates. About 40 percent of the post-graduates strongly agreed upon it. As far as the illiterates are concerned, nearly three-fourth of them is agreed that governments' ban can successfully create awareness on eco-friendly packaging. Around 62.8 percent of the respondents whose education level is in other category are also agreed the same. Very few respondents disagreed and undecided that eco-friendly packaging awareness created through government's ban on plastics, while only one person from graduate and school level education strongly disagreed on the same. So the respondents in all educational background believe that government should take firm action to ban plastics at every level.

At present unsafe and improper disposal of plastic wastes clogged drainage channels, polluting environment and ultimately becoming a permanent hazard. Unhygienic surroundings were ideal ground for mosquitoes breeding, which could result in the spread of various diseases. In considering the hazardousness and environmental concern, necessary steps should be taken to overcome the impact of packaging. In this regard, consumers' opinions are taken into account.

**Table 3: Opinion to Overcome the Impact of Packaging**

S. No.	Overcome the Impact of Packaging	Score	Rank
1	Recycling of Plastics	446	VI
2	Use of Eco-friendly packaging	2622	I
3	Reusing/Refilling of packaging	1328	III
4	Avoidance of earlier disposal	867	IV
5	Avoidance of over packaging	1660	II
6	Conservation of resources by reuse/recycle/reduce	752	V

The respondents' opinion to overcome the impact of packaging is analyzed by using rank test. It shows that use of eco-friendly packaging edges the top, the consumers ranked second on avoidance of over packaging. The analysis also indicates that reusing/ refilling of packaging and avoidance of earlier disposal occupied third and fourth ranks respectively. Conservation of resources by reuse/recycle/reduce takes fifth place. Recycling of plastics scores sixth place and played the least important. So the consumers are strong enough in support of using eco-friendly packaging.

**Table 4: Test of Consumers' Opinion on Overcome the Impact of Packaging**

S. No.	Profiles of Consumers	X <sup>2</sup> -Value	P value
1	Gender	3.847	0.572
2	Age	22.758	0.089
3	Education	26.996	0.135
4	Occupation	51.728	0.001
5	Income	19.287	0.503
6	Region	15.046	0.010

The relationship between the profiles of the respondents and their opinion to overcome the impact of packaging is analyzed in table 4. Analysis shows that the gender, age, education and income of the respondents do not have significant association with the opinion to overcome the impact of packaging as their P values are more than 0.05 at 5% level of significance. In contrast to the above, the residence and occupation of the respondents have significant association with the opinion to overcome the impact of packaging as their P value are less than 0.05 at 5% level of significance. Hence opinion of the respondents with regard to overcome the impact of packaging is mainly based on their region and occupation.

No doubt, environment should be protected. A major threat to it is use of plastics. In order to bring this to the minds of people, an effective system of campaign is required. It must have attractive words in the form of slogans. They might have impressed the consumers largely to react accordingly.

**Table 5: Impressive Awareness Slogans on Safety of the Environment**

Awareness Slogans	SA	A	UD	DA	SDA	Score	Rank
Quit Plastics & Save Earth	465	1784	96	4	2	2351	<b>I</b>
Earth day Every day	5	340	87	20	4	456	<b>X</b>
Go Green or go home	45	328	126	14	2	515	<b>VIII</b>
Save the earth plant a tree	480	1608	150	46	11	2295	<b>III</b>
Think green	100	192	192	30	6	520	<b>VII</b>
Save water! Save life!	495	1608	135	48	12	2298	<b>II</b>
Keep your earth clean and green	430	848	84	74	19	1455	<b>V</b>
Go green, help clean	120	152	144	26	39	481	<b>IX</b>
Less pollution is the best solution	210	348	120	24	22	724	<b>VI</b>
Save water, it will save you later!	390	1316	114	46	19	1885	<b>IV</b>
Never refuse to reuse	25	80	48	74	26	253	<b>XI</b>
Don't throw it away, it can be used in some other way	20	68	45	56	26	215	<b>XII</b>

SA-Strongly Agree, A – Agree, UD-Uncecided, DA-Disagree, SD-Strongly Disagree

An impressive awareness slogan towards safety of the environment should reach the people considerably. The slogan of quit plastics and save earth holds the first place as it is widely reached the consumers and it is followed by save water, save life slogan. Save the earth, plant a tree, and save water, it will save you later slogans are placed in third and fourth ranks respectively. It also indicates that the slogans of keep your earth clean and green and less pollution is the best solution are ranked fifth and six respectively. Think green, go green or go home and go green, help clean slogans are placed in seventh, eighth and ninth ranks respectively. It is followed by earth day, every day and never refuse to reuse slogans occupied tenth and eleventh positions. The slogan of don't throw it away, it can be used in some other way is low among the respondents. Hence the slogan of quit plastics and save earth is highly impressive among the consumers as to save the environment.

**Table 6: Eco-friendly Awareness Slogan of Quit Plastics and Save Earth – Education wise Analysis**

Levels of Opinion							
Level of Education	NA	SDA	D	UD	A	SA	Total
School Level	19 (5.3)	0	0	10 (2.8)	295 (81.7)	37 (10.2)	361 (100)
Graduate	0	2 (1.9)	1 (1.0)	8 (7.6)	71 (67.6)	23 (21.9)	105 (100)
Post-Graduate	1 (1.7)	0	1 (1.7)	12 (20.0)	36 (60.0)	10 (16.7)	60 (100)
Illiterates	9 (25.7)	0	0	1 (2.9)	22 (62.9)	3 (8.6)	35 (100)
Others	0	0	0	1 (2.3)	22 (51.2)	20 (46.5)	43 (100)
Total	29 (4.8)	2 (0.3)	2 (0.3)	32 (5.3)	446 (73.8)	93 (15.4)	604 (100)

Source: Primary Data. Figures in brackets indicate percentage: NA - Not Applicable, SD – Strongly Disagree, D – Disagree, UD – Undecided, A – Agree, SA – Strongly Agree

Analysis of educational qualification of the respondents and the impressive awareness slogans on eco-friendly packaging revealed that about 81.7 percent of the respondents whose education is at school level agreed that quit plastics and save earth as an impressive slogan on eco-friendly packaging. More than 67 percent of the graduates are also agreed the same. This is 60 percent in case of post-graduates. As far as the illiterates are concerned, 62.9 percent of them and 51.2 percent of the respondents with other category are also in line with. It is followed by 46.5 percent of the respondents in the same category strongly agreed that this slogan impresses. Very few respondents in all age categories disagreed and strongly disagreed that quit plastic and save earth as impressive awareness slogan on eco-friendly packaging. Hence more than 70 percent of the respondents agreed that quit plastic and save earth as impressive awareness slogan on eco-friendly packaging in all categories of education.

### 3. CONCLUSION

The environment problems are growing rapidly in worldwide. In India, the increasing economic development, rapid growth of population and growth of industries is putting a strain on the environment, infrastructure and the countries natural resources. It is need of an hour to address the same. This study observes that the government should make awareness to the people and virtue of ban on plastics. The consumers themselves use eco-friendly packaging to overcome the impact over environment. A slogan of quit plastics and save earth impressed the people to a core extent. The awareness can be created through various medium like newspapers, TV, Radio and social networks. More corporate should involve and create awareness among consumers regarding the benefits following eco-friendly practices to maintain a cleaner and greener environment. Consumers need to

pressurize effects minimize the effects on the environment friendly. Green marketing assumes even more importance and relevance in developing countries like India.

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# Social Intelligence Of Secondary School Teachers

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## Abstract

*Social intelligence is closely related to one's own, personality and individual behavior. Those with social intelligence are fully aware of them and understand their environment. This enables them to control their emotions, make decisions about their goals in life. Social intelligence is the ability to understand and manage men and women, boys and girls, to act wisely in human relations. Social intelligence is that part of the individual's mental ability which generates in him the capacity to adapt him to the society. The present study intended to find out the Social Intelligence of Secondary school teachers. This study belongs to survey method and the study was selected at Kadapa district of Andhra Pradesh by using simple random sampling technique. The total number of sample consists of 700 Secondary School Teachers.*

## 1. INTRODUCTION

Edward L. Thorndike maintained that there are three intelligences: abstract, mechanical and social. Daniel Goleman explain a ground-breaking synthesis of the latest finding in biology and brain science, revealing that we are "wired to connect" and the surprisingly deep impact of our relationships on every aspects of our lives. Social intelligence is also called behavioral intelligence, to conclude social intelligence is the human capacity to understand what is happening in the society and responding to that understanding in the personality and socially effective manner. social intelligence consists of the ability to act in different social situations to discover other people's feelings and interests, to organize

groups and negotiate solutions, to establish personal relationships with others, to express one's feelings to others to interact and participate with others in various events, to recover from embarrassing situations with the least possible losses, to recognize one's errors and failure and them, to adapt quickly to any medium one is placed in and to persuade others of one's personal view. Though everyone needs intelligence in general and social intelligence in particular especially the teachers need social intelligence in to interact and to understand with students in the school environment is very much essential. High social intelligence is possessed by those who are able to handle people well. Social intelligence has different dimensions- Patience (b) Cooperativeness (c) Confidence (d) Sensitivity (e) Recognition of Social Environment (f) Tactfulness (g) Sense of Humour (h) Memory.

- **Social intelligence Definitions**

The original definition by Edward Thorndike in 1920 is "the ability to understand and manage men and women, boys and girls, to act wisely in human relations"

## 2. REVIEW OF RELATED LITERATURE

- **Mudita K. Bhatnagar and Suman (2012)** found that the urban adolescents are more social and unreserved than the rural adolescents and they disclose their feelings more quickly than the rural adolescents. The rural adolescents are socially intelligent than the urban adolescents. There is positive relationship between the two variables self-disclosure and social intelligence.
- **P.Suresh Prabu (2015)** found that Rural and urban area students differ significantly in their social intelligence scores.
- **Sembiyan, R and Visvanathan, G (2012)** found that there is no significant difference in the social intelligence of urban and rural college students and it is inferred that the rural students have more level of social intelligence than the urban students.
- **S.Vijayavardhini (2013)** found that majority of the university students of Rayalaseema Region revealed high level of social intelligence with respect to the Dimension of confidence and patience. Majority of the university students revealed Low level of social intelligence with respect to the dimension of memory (93%) Sense of Humour (88%) recognition (83%) and Tactfulness. The university students expressed higher level of social intelligence with respect to the dimension of sensitivity (34%) and cooperativeness (30%).

## 3. OBJECTIVES

- I. To assess the Social intelligence of Secondary school teachers with respect to (a) Patience (b) Cooperativeness (c) Confidence (d) Sensitivity (e) Recognition of Social Environment (f) Tactfulness (g) Sense of humour (h) Memory dimensions and in total.
- II. To find out the significance difference if any in the Social intelligence of Secondary school teachers due to variations in their There will be no significant difference in the Social intelligence of Secondary school teachers due to variation in their Community and Locality of the School.

#### 4. HYPOTHESES

To study the present problem the researchers formulated the following hypotheses.

**H1:** There will be no significant difference between the Social Intelligence levels among the Secondary School Teachers.

**H2:** There will be no significant difference in the Social intelligence of Secondary school teachers due to variation in their Social Background.

**H3:** There will be no significant difference in the Social intelligence of Secondary school teachers due to variation in their Locality of the school.

#### 5. RESEARCH METHODOLOGY

Keeping in view the objectives and scope of the present study the investigators adopted survey method to carry out this research.

##### 5.1 Sample

The population of the present research study is Secondary school teachers. In this problem the investigator selected 700 Secondary school teachers who are working in Govt., Z.P. and Municipal High schools located in Kadapa district of Andhra Pradesh by employing Simple random sampling technique.

##### 5.2 Tool

In this investigation the investigators adapted Social intelligence scale which is developed by Chadda. N.K. and Usha Ganesan Delhi with very slight modifications. This scale consists of 66 items. These items were grouped under 8 dimensions i.e. (a) Patience (b) Cooperativeness (c) Confidence (d) Sensitivity (e) Recognition of Social Environment (f) Tactfulness (g) Sense of Humour and (h) Memory. This tool has constructive, Content, Face and Intrinsic validity and reliability. Both the English and translated Telugu versions of the Social intelligence scale was administered to the sample for collecting required necessary data to study the present problem.

##### 5.3 Statistical Techniques

To analyze the collected data the investigators Mean, SD, "t" and 'F' ratios statistical techniques were employed.

#### 6. RESULT AND DISCUSSION

##### 6.1 Levels of Social Intelligence of Secondary school Teachers

**Objective:** To study the Social Intelligence levels of teachers working in Secondary school for the whole sample following null-hypothesis is formulated.

**Hypothesis:** There will be no significant difference between the Social Intelligence levels among the Secondary School Teachers.

The computed data of the Teacher's level of Social Intelligence based on their corresponding Mean Scores on various dimensions is shown in table-1. From the total scores it found that majority of the sample (57.30) expressed Moderate level of Social Intelligence, only 30% of the Secondary School Teachers expressed High level of Social

Intelligence and less percentage of sample (12.70) responded Low level of Social Intelligence.

It is clear from table-1, that for the Patience, Confidence and Sensitivity dimensions, majority of teachers showed a higher level of Social Intelligence (59.57%, 62.29% and 64.43% respectively). Coming to the dimension Cooperativeness, there is less variation in the levels of Social Intelligence of Secondary School Teachers (High: 37.57%, Moderate: 29.71% and Low: 32.70). There is little higher percentage of samples (44.29%) having High level Social Intelligence and 35.57% of samples hold Moderate level of Social Intelligence. But for the dimensions Recognition of Social environment, Tactfulness and Sense of Humour majority of the sample (57.90, 85.30 and 76.40 respectively) exhibited Low level of Social Intelligence. Whereas, 39.43% of samples expressed Moderate level of Social Intelligence to the dimension Recognition of social environment and only 2.71% hold High level Social Intelligence. Amazingly very negligible proportion of samples (0.143%) demonstrated High level Social Intelligence with regard to Tactfulness.

**Table- 1: Levels of Social Intelligence of Secondary school teachers Based on their corresponding Mean Scores**

Social intelligence		Social intelligence Levels					
		Low		Moderate		High	
		N	%	N	%	N	%
A.	Patience	122	17.40	161	23.00	417	59.57
B.	Cooperativeness	229	32.70	208	29.71	263	37.57
C.	Confidence	190	27.10	74	10.57	436	62.29
D.	Sensitivity	105	15.00	144	20.57	451	64.43
E.	Recognition of Social Environment	405	57.90	276	39.43	19	2.71
F.	Tactfulness	597	85.30	102	14.57	1	0.143
G.	Sense of Hummer	535	76.40	156	22.29	9	1.28
H.	Memory	141	20.10	249	35.57	310	44.29
Total		89	12.70	401	57.30	210	30.00

Note: Frequencies and percentages mentioned in table-1 are based on the number of teachers who fall under the attitude levels viz., Low, Moderate and High shown in table-1

## 6.2 Social Intelligence Of The Secondary School Teachers With Respect To Their Social Status.

**Objective:** To find out the Social Intelligence of Secondary School Teachers with respect to their Social Status.

To study the above objective the investigator divided the Secondary School Teachers into three groups based on their Social status namely, (1) OC, (2) BC and (3) SC/ST and the following hypothesis was formulated.

**Hypothesis:** There will be no significant difference in the Social Intelligence of Secondary School Teachers due to variation in their Social Status.



To test the hypothesis Mean, S.D., F-ratios and t-values were computed for the total scale and for each dimension of the scale. The obtained results are shown in table.-2.

It is observed from the table-2 that F-ratio for the Secondary School Teachers' Social Intelligence score of total scale is (0.501) not significant at 0.05 level. F-ratio of the Social Intelligence score for the dimensions Recognition of Social Environment and Tactfulness are 4.107 and 3.092 respectively and significant at 0.05 level. It is also clear from the F-ratio of the Social Intelligence scores of the sample group for the rest of the dimensions namely, Patience, Cooperativeness, Confidence, Sensitivity, Sense of Humour and Memory dimensions are not significant at 0.05 level with respect to Social Status.

From the t-values of Social Intelligence scores for the dimensions Recognition of Social Environment and Tactfulness it is found that

(i) There is significant difference between OC and SC/ST Social Background group sample in their Social Intelligence for the dimension Recognition of Social Environment (t13: 2.180, significant at 0.05 level). From the Mean scores it is found that teachers belongs to OC Social Background group express more Social Intelligence than the teachers belongs to BC and SC/ST groups for the same dimension.

(ii) There is significant difference the OC and BC Social Status group teachers in their Social Intelligence for the dimension Tactfulness. From the Mean scores it is clear that teachers belong to BC Social Background holds higher Social Intelligence than the OC for the same dimension. For the rest of the dimensions it is found from the calculated t-values that there no significant difference observe between Social Status groups of sample in their Social Intelligence.

**Table -2: Mean, SD, F-ratios and t-values of the Secondary School teachers for the Social Intelligence scale with respect to their Social Status.**

Social Intelligence		Social Back Status		N	Mean	S.D.	F-Ratio	t-value	
A	Patience	1	OC	294	19.40	2.268	1.097@	t 1.2	0.586@
		2	BC	246	19.52	2.124		t 1.3	1.454@
		3	SC/ST	160	19.73	2.192		t 2.3	0.955@
		Total		700	19.52	2.201			
B	Cooperativeness	1	OC	294	24.81	2.492	1.888@	t 1.2	0.967@
		2	BC	246	24.60	2.483		t 1.3	1.156@
		3	SC/ST	160	25.09	2.520		t 2.3	1.940@
		Total		700	24.80	2.498			
C	Confidence	1	OC	294	294	19.23	0.252@	t 1.2	0.486@
		2	BC	246	246	19.33		t 1.3	0.678@
		3	SC/ST	160	160	19.38		t 2.3	0.227@
		Total		700	19.30	2.234			
D	Sensitivity	1	OC	294	21.01	2.587	0.641@	t 1.2	1.124@
		2	BC	246	20.76	2.652		t 1.3	0.386@
		3	SC/ST	160	20.91	2.561		t 2.3	0.589@
		Total		700	20.90	2.603			



E	Recognition of Social Environment	1	OC	294	1.48	0.622	<b>4.107*</b>	t 1.2 t 1.3 t 2.3	1.405@ <b>2.810**</b> 1.591@
		2	BC	246	1.40	0.590			
		3	SC/ST	160	1.31	0.604			
		<b>Total</b>		700	1.41	0.609			
F	Tactfulness	1	OC	294	3.09	1.103	<b>3.092*</b>	t 1.2 t 1.3 t 2.3	<b>2.360*</b> 1.750@ 0.311@
		2	BC	246	3.33	1.192			
		3	SC/ST	160	3.29	1.200			
		<b>Total</b>		700	3.22	1.161			
G	Sense of Humour	1	OC	294	3.58	1.225	0.479@	t 1.2 t 1.3 t 2.3	0.351@ 0.739@ 0.937@
		2	BC	246	3.62	1.445			
		3	SC/ST	160	3.49	1.182			
		<b>Total</b>		700	3.58	1.297			
H	Memory	1	OC	294	9.85	1.755	0.454@	t 1.2 t 1.3 t 2.3	0.641@ 0.386@ 0.915@
		2	BC	246	9.75	1.823			
		3	SC/ST	160	9.91	1.684			
		<b>Total</b>		700	9.83	1.762			
<b>Total Scale</b>		1	OC	294	102.46	8.435	0.501@	t 1.2 t 1.3 t 2.3	0.214@ 0.809@ 0.981@
		2	BC	246	102.30	8.278			
		3	SC/ST	160	103.11	7.945			
		<b>Total</b>		700	102.55	8.264			

@= not significant at 0.05 level \* = Significant at 0.05 level \*\* = Significant at 0.01 level

**Table value for F-ratio at 0.05 level=3.01 and at 0.01 level=4.65**

**Here:** t 1.2: t-value of 'OC' and 'BC' Social Background

t 1.3: t-value of 'OC' and 'SC/ST' Social Background

t 2.3: t-value of 'BC' and 'SC/ST' Social Background

Hence the hypothesis "there will be no significant difference in the Social Intelligence of Secondary School Teachers due to variation in their Social Status" is rejected for the dimensions Recognition of Social Environment and Tactfulness; and it is accepted for Patience, Cooperativeness, Confidence, Sensitivity, Sense of Humour and Memory dimensions and for the total scale also. Therefore it is concluded that irrespective of the Social Status teachers working in Secondary school don't have any significant difference among in their Social Intelligence with regard to Patience, Cooperativeness, Confidence, Sensitivity, Sense of Humour and Memory dimensions and for the total scale.

### **6.3 Social Intelligence Of The Secondary School Teachers With Respect To Their Locality Of The School**

**Objective:** To find out the Social Intelligence of Secondary School Teachers with respect to their Locality of the School.

To study the above objective the investigator divided the Secondary School Teachers into two groups based on their Locality viz. (1) Urban and (2) Rural the following hypothesis was formulated

**Hypothesis:** *There will be no significant difference in the Social Intelligence of Secondary School Teachers due to variation in their Locality of the School.*

To test the hypothesis Mean, S.D. and t-values were computed for the total scale and each dimension of the scale. The obtained results are shown in table-3. It is observed from table -3 that the calculated t-value for the total Social Intelligence scale (1.056) is not significant at the 0.05 level. It is depicted from the Mean and SD scores that, there is no significant variation between of the Rural and Urban Secondary School Teachers in their Social Intelligence. Calculated t-values of all the 8 dimensions namely Patience, Cooperativeness, Confidence, Sensitivity, Recognition of Social Environment, Tactfulness, Sense of Humour and Memory are also not significant at 0.05 level. It is also found that, there is no significant variation between the Social Intelligence scores of the Secondary School Teachers working in both Rural and Urban localities for all the dimensions.

**Table-3: Mean, SD and t-values for the Social intelligence scale Dimension wise and in total of the teachers with respect to Locality of the School**

Social Intelligence Scale	Locality Of The School	N	Mean	SD	T-Value
A	Urban	284	19.57	2.187	0.494@
	Rural	416	19.48	2.213	
B	Urban	284	24.99	2.485	1.647@
	Rural	416	24.67	2.503	
C	Urban	284	19.35	2.232	0.427@
	Rural	416	19.27	2.237	
D	Urban	284	20.92	2.545	0.201@
	Rural	416	20.88	2.645	
E	Urban	284	1.41	0.573	0.019@
	Rural	416	1.41	0.634	
F	Urban	284	3.20	1.144	0.270@
	Rural	416	3.23	1.173	
G	Urban	284	3.58	1.282	0.148@
	Rural	416	3.57	1.308	
H	Urban	284	9.93	1.708	1.228@
	Rural	416	9.76	1.797	
Total Scale	Urban	284	102.95	7.752	1.056@
	Rural	416	102.28	8.595	

@= not significant at 0.05 level    \*= Significant at 0.05 level    \*\*= Significant at 0.01 level

Hence the hypothesis “there will be no significant difference in the Social Intelligence of Secondary School Teachers due to variation in their Locality of the School” is accepted for all the dimensions of the scale and for the total scale also. Therefore it is concluded that teachers working in both Rural and Urban localities areas are don’t have any significant difference in their Social Intelligence.

Therefore Locality of the school does not show any significant impact in the Social Intelligence of Secondary School Teachers.

## **7. FINDINGS OF THE STUDY**

- Majority of the respondents from whole sample expressed Moderate level of Social Intelligence. For dimension of Social Intelligence namely Patience, Confidence and Sensitivity, majority of Secondary school teachers showed a higher level of Social Intelligence. For the dimensions Recognition of Social environment, Tactfulness and Sense of Humour majority of the whole sample exhibited Low level of Social Intelligence.
- There is significant difference in the Social Intelligence score for the dimensions Recognition of Social Environment and Tactfulness. Teachers belonging to OC Social background group expressed more Social Intelligence than the teachers belonging to BC and SC/ST groups for the dimension Recognition of Social Environment. Teachers belong to BC Social background hold higher Social Intelligence than the OC for the dimension Tactfulness. For the rest of the dimensions namely, Patience, Cooperativeness, Confidence, Sensitivity, Sense of humor and Memory dimensions there is no significant difference observed with respect to Social background.
- It is concluded that irrespective of the Social background teachers working in Secondary school don't have any significant difference among in their Social Intelligence with regard to Patience, Cooperativeness, Confidence, Sensitivity, Sense of Humour and Memory dimensions and for the total scale.
- There is no significant variation between of the Rural and Urban Secondary School Teachers in their Social Intelligence as a whole and for all the 8 dimensions.
- Therefore it is concluded that teachers working in both Rural and Urban localities areas are don't have any significant difference in their Social Intelligence and Locality of the school does not shown any significant impact in the Social Intelligence of Secondary School Teachers.

## **8. CONCLUSION**

Teacher occupies an important place in the society. He is the most vital component in the school system, he who shapes and moulds the personality of the children in a desirable manner. In the words of the great philosopher Cicero 2000 years back "what great gift can we offer for the republic, than to teach and instruct our children? Yes it is true today also. Instruct the child to develop right attitudes, high ideas and true appreciations of the freedom and responsibilities of a good citizen. Teachers play a significant role in character building and develop skills for critical thinking. A good teacher is there at the back of every great personality, who kindled enthusiasm, fostered confidence and guided them in a right direction. A teacher is one who always concern with the children who are the political leaders of tomorrow and to teach and train them for future citizenship. The teacher should be Patience in listening and handling the students, problems, with respect

to their personal, academic social and psychological. The teacher should also develop Sense of Humour and create congenial classroom environment to make the teaching learning process in a joyful manner.

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# Construction of Self-Regulation Questionnaire (General)- SRQ-G

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KeyWords	46 Item Scale, Self-Regulation, Questionnaire, Correlation, Reliability, 200 Secondary School Students (Aged 13-16Yrs)				

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## Abstract

*A forty six item scale was constructed to measure self-regulation (general) amongst secondary school students (adolescents aged thirteen to sixteen years of age). Initially forty nine items or reasons were framed which spread across eight stem questions. These were tested for item-total correlation and reliability. This scale was administered to 200 secondary school students. The coefficients of alpha reliability on all the four dimensions of self-regulation (extrinsic, introjected, identification and intrinsic self-regulation), ranged between .71 to .82 for boys (N=100), .68 to .82 for girls (N=100) and .70 to .82 for the total sample (N=200). Only items having item-total correlation of more than .20 were retained. Thus, forty six items were retained and three items with less than .20 item-total correlations were deleted.*

## 1. INTRODUCTION

Self-regulation (or self-control) is a highly adaptive human trait and capacity to alter one's response which includes one's thoughts, feelings, and habitual patterns of behaviour. It facilitates success in various spheres of life encompassing interpersonal relationships, achievement in academics, as well as coping with and adjusting to stress (e.g. Baumeister, Heatherton, & Tice, 1994; Shoda, Mischel, & Peake 1990; Tangney, Baumeister, & Boone, 2004).

Deci & Ryan in their famous self- determination approach ( Deci & Ryan, 1991; Ryan, 1993) have proposed that "... internalization is the process of transforming external regulations into internal regulations and when this process functions optimally, then finally integrating those regulations into one's sense self."

But when a person starts identifying with the actual value of a task and accepts full responsibility for doing it is then referred to as integration. A person behaves volitionally



because such behavior is important or useful for accomplishing one's personal goals. As a result in integrated regulation one would not have to experience tension and conflict associated with introjection (Deci et. al, 1994).

Intrinsically motivated behaviours are therefore, more integrated with the self. The phenomenon of intrinsic motivation reflects the positive potential of human nature which is defined by Ryan & Deci (2000) as 'the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore and to learn'. In initial years exploratory behavior is indicative of intrinsic motivation and attachment theorists (e.g. Bowlby 1979) suggest that it is more evident when the infant is securely attached to a parent.

On the other hand extrinsic motivation "refers to the performance of an activity in order to attain some separable outcome and thus, contrasts with intrinsic motivation, which refers to doing an activity for the inherent satisfaction of the activity itself (Ryan & Deci, 2000)." SDT proposes that extrinsic motivation is not entirely non- autonomous but it can change vastly in its relative autonomy (Ryan & Connell, 1989; Vallerand, 1997). Another sub theory in SDT called organismic integration theory (OIT) was introduced by Deci & Ryan (1985), to elaborate various types of extrinsic motivation and the situational factors that either hinder or promote internalization and integration of these behaviours. The extrinsically motivated behaviours which are low on autonomy are termed as externally regulated. These behaviours are performed to satisfy an external demand or reward contingency. Such individuals feel that their behavior is being controlled and this gives them a sense of alienation. Their actions have an external perceived locus of causality (deCharms, 1968).

Another type of extrinsic motivation is labeled introjected regulation. Introjection entails taking in a regulation but not entirely accepting it as one's own. The main aim of certain behaviours shown in introjected motivation is to avoid guilt or anxiety or to attain ego enhancements such as pride or to maintain feelings of worth. Therefore, it is a relatively controlled form of regulation. For Deci et.al (1994) "introjection refers to internalization in which the person 'takes in' a value or regulatory process but does not identify with or accept it as his own. Instead, it becomes an inner control- a rule of action that is enforced by sanctions such as threats of guilt or promises of self- approval." Regulatory processes that have been introjected under what Ryan (1982) referred to as internally controlling regulation, a style that is characterized by a pressure by one's own self. There is ample evidence which indicates that both internally controlling regulation and regulation by external controls, is accompanied by pressure, tension and anxiety (e.g. Ryan & Connell, 1989).

Yet another form of regulation which is more autonomous or self-determined is regulation through identification. A person showing such behavior consciously values a behavioural goal or regulation and also accepts and owns the action as personally important. Finally, the most autonomous form of extrinsic motivation is 'integrated regulation'. It is only when the identified regulations are assimilated to the self that

integration occurs. It entails that these regulations have been evaluated and brought into congruence with one's otherwise existing values and needs. The behavioural qualities featured in integrated motivation is very similar to those of intrinsic motivation, even though these are still categorized as extrinsic because they are not done for their inherent enjoyment but to attain separable outcomes. Some of the studies have merged together identified, integrated, and intrinsic forms of regulation in order to form a composite autonomous motivation.

Ryan & Connell (1989) have explained these gradations in self-regulation by means of four subscales (viz. external, introjected, identified, and intrinsic) varying from less to more autonomous behaviour. They have examined different reasons for action, with different reasons depicting the extent of autonomy or control in initiating and regulating those behaviours in a specific skill domain.

The first category of reasons (external) denotes behaviours explained in terms of external authority, fear of punishment, or rule compliance. the second category of reasons, i.e. 'introjected' are reasons in terms of internal, esteem-based pressures to act, such as avoidance of guilt or shame, or to gain approval. 'Identified' reasons refer to actions that are initiated to achieve self-valued goals, while intrinsic ones pertain to behaviours emitted for the inherent enjoyment of the activity itself for example, a child may do his homework for various reasons like reward (external reason), gaining teacher's approval (introjected reason), understanding the subject better (identified reason) or because he enjoys doing it (intrinsic reason).

The authors have combined the scores on these categories by means of weighted scores, to compute an index of self-determination learning that has been referred to as the "Relative Autonomy Index" (RAI, Connell & Ryan (1985). Such an index for self-determination and self-regulation has been successfully used by several researchers (Grolnick & Ryan, 1987a, 1989).

In addition to this, Ryan & Connell (1989) have assessed the reasons for action in two domains, viz. academic achievement and prosocial behaviour. This itself shows that perceived locus of causality may vary from one area to another. In other words, the degree of an individual's autonomy may be different in different fields, with the individual showing more autonomy in one field (e.g. interpersonal relations) as compared to another (e.g. scholastic achievement). This suggests that by using domain specific scale of self-regulation, predictions of behaviour may become more concrete and meaningful. The need for a scale was felt which could measure self-regulation in daily life activities such as getting up early or finishing one's task. The scale was constructed on the same pattern as that of self-regulation Questionnaire-Academic (Ryan & Connell, 1989).

## **2. DEVELOPMENT OF THE SCALE**

Scale measuring children's self-regulation in dealing with daily tasks was planned to be developed. The process of scale construction included a series of systematic steps viz., item selection and phrasing, conducting item analyses, and establishing the reliability of

the scale developed. These steps that were undertaken have been explained in detail below:

### **2.1 Item Selection And Phrasing**

Considering the variety of tasks performed by children daily, the existing literature was scanned to prepare suitable items. Scales by Pal, Misra & Pandey (1985), Lay (1986), Ryan & Connell (1989), and Milgram & Amir (1998) served as guidelines. A large number of items were prepared on the basis of these scales. The statements were as simply worded as possible so that these could be easily understood by the subjects. These statements were scrutinized by the supervisor, the investigator and other teachers of psychology to do away with any kind of bias and confusion.

The stem and reason categories included in the scale were based on the same pattern as that of Self-regulation Questionnaire-Academic (Ryan & Connell, 1989). There were forty nine reason categories spread across eight stem questions. Each stem consisted of three to seven reasons. These reasons can be clubbed under four reason categories as devised by Ryan & Connell (1989). These reasons are external, introjected, identified and intrinsic. Each reason could be rated on a four point scale as being very true, sort of true, not very true, and not at all true for the subject. These responses were scored as 4, 3, 2, and 1 respectively. Thus four scores would be obtained in all by adding the scores of each of the four reason categories for each subject. Then a weighted score would be calculated by combining the scores on the self-regulatory styles. The formula for weighting that is used is; to multiply the 'external score' by -2, the 'introjected score' by -1, the 'identified score' by +1, and the 'intrinsic score' by +2. The weighted scores are then added to compute an index of self-determination in learning that has been referred to as the; Relative Autonomy Index by Ryan & Connell, where higher score would indicate greater self-regulation.

### **2.2 Item Analyses**

Item selection and phrasing was followed by item analyses in order to check the validity of the items. For this purpose the scale was administered to 200 secondary school students. Children studying in ninth and tenth classes were included. The sample was restricted to English medium co-educational schools of Udaipur (Rajasthan) where one tends to find children coming from middle to upper middle class families. The scale was administered in small groups and the subjects' responses were obtained and scored in the same way as described earlier. Item-total correlations were calculated separately for boys and girls sample and together for the total sample on all the four reason categories which is presented in table 1 and table 2.

**Table 1: Item-total correlations of extrinsic and introjected reason category items separately for boys, girls and total sample**

Extrinsic				Introjected			
Item no.	Boys n=100	Girls n=100	Total N=200	Item no.	Boys n=100	Girls n=100	Total N=200
1	.53	.52	.52	1	.34	.37	.35
2	.38	.42	.39	2	.52	.42	.47

3	.50	.57	.53	3	.26	.39	.33
4	.49	.34	.41	4	.55	.41	.48
5	.41	.44	.42	5	.61	.52	.56
6	.52	.51	.52	6*	.10	.37	.22
7	.53	.55	.54	7	.43	.52	.48
8	.43	.54	.48	8	.45	.49	.48
9	.64	.55	.59	9	.56	.49	.53
10	.51	.54	.53	10	.51	.58	.54
11	.33	.45	.39	11	.47	.53	.49
				12	.20	.39	.28

**Table 2: Item-total correlations of identification and intrinsic reason category items separately for boys, girls and total sample**

Identification				Intrinsic			
Item no.	Boys n=100	Girls n=100	Total N=200	Item no.	Boys n=100	Girls n=100	Total N=200
1	.27	.33	.30	1	.52	.43	.47
2	.45	.41	.39	2	.66	.51	.57
3	.35	.25	.32	3	.61	.50	.55
4	.29	.29	.29	4	.30	.23	.26
5	.34	.33	.34	5	.53	.42	.48
6	.28	.26	.28	6*	.19	.27	.23
7	.33	.38	.35	7	.53	.24	.39
8	.23	.28	.26	8	.54	.36	.45
9	.32	.40	.36	9	.25	.27	.26
10	.32	.36	.35	10	.29	.46	.37
11	.31	.31	.31	11	.43	.57	.49
12*	.47	.17	.35	12	.47	.49	.48
13	.39	.26	.34	13	.46	.32	.39

**\*Deleted items**

Out of these items those which had a correlation coefficient of less than .20 with the total score for all the four reason categories were deleted.

For the external reason category all the items were found to have high item-total correlations so, all the eleven items were retained. As far as introjected reason category is concerned, item number six had a very low item-total correlation of .106 for boys so, it was thought better to delete this item although item-total correlation for girls was .37 and for total sample it was .22 which was more than cut-off limit of .20. Finally out of twelve items for introjected category eleven were retained after deleting item number six. For the identification reason category except for item number twelve which had item-total correlation of .17 for girls, all other items have been retained. Out of thirteen items, item number 12 has been deleted which left twelve items in all for identification reason



category. As far as intrinsic reason category is concerned there were thirteen items out of which twelve were retained as item number 7 was found to have a low item-total correlation of .19 for boys. The item-total correlation for girls was .27 and total sample was .23. The girls and the boys' sample were taken separately to compare their self-regulation and also to make sure that all items are compatible for both boys and girls.

In all there were forty nine reasons spread across eight stem questions out of which three reasons belonging to three different reason categories were deleted leaving us with forty six reasons spread across eight stem questions. Thus, a scale measuring self-regulation (general) was devised which consisted of forty six items under eight stem questions. The final version of the scale has been presented in the appendix.

### 3. RELIABILITY OF SELF-REGULATION QUESTIONNAIRE - GENERAL

Testing the reliability of the scale was the final step for which the internal consistency of the scale was calculated (using the statistical technique of Cronbach alpha). This was based on the dispersion of scores on each item as well as on the total scores obtained by a group of subjects. For establishing internal consistency of the scale, the scale was administered to groups of ninth and tenth class students. Their responses were scored on all the four reason categories. Cronbach alpha values for all the four different reason categories were obtained for both boys and girls separately and for the total sample. These have been reported in table 3. The table reveals that all the alpha values are high ranging from .68 to .82. The alpha reliability for external self-regulation category was .82 for the total sample and .79 and .70 for introjected and identification category respectively. For intrinsic category this value was .79 for the total sample

**Table 3: Reliability of Self-Regulation Questionnaire- General for secondary school children**

Reason Categories	Boys (N=100)	Girls (N=100)	Total (N=200)
External	.82	.82	.82
Introjected	.77	.81	.79
Identification	.71	.68	.70
Intrinsic	.81	.78	.79

Thus, the scale developed by the present investigator is fairly valid and reliable and can be used with confidence to assess self-regulation- general of secondary school children. The internal consistency values for Self-Regulation Questionnaire-Academic (Ryan & Connell, 1989) also ranged from .62 to .82. As far as inter-correlations among these categories are concerned, these have been presented in table 4.

**Table 4: Inter-correlations among different reason categories and Relative Autonomy Index (N=200)**

Variable	IN (intrinsic)	ID (identification)	EX (extrinsic)	IND (introjected)	RAI (Relative Autonomy Index)
IN	1.00				



<b>ID</b>	.45	1.00			
<b>EX</b>	.21	.40	1.00		
<b>IND</b>	.34	.51	.52	1.00	
<b>RAI</b>	.62	.15	-.60	-.27	1.00

The table below shows these correlations among different reason categories as obtained by Ryan & Connell (1989) for Self-Regulation Questionnaire- Academic.

A look at table 4 shows that there is positive relationship between intrinsic and identification reason categories with Relative Autonomy Index as had been expected. Moreover, the extrinsic and introjected reason categories show negative correlation with Relative Autonomy Index which means higher the Relative Autonomy Index score higher the self-regulation of a person and this will ultimately lead to lesser dependence on external forces for self-actions and decisions.

**Table 5: Inter-correlations among different reason categories of urban elementary school children (Ryan & Connell, 1989) (N=112)**

Variable	IN (intrinsic)	ID (Identification)	EX (extrinsic)	IND (introjected)
<b>IN</b>	1.00			
<b>ID</b>	.46	1.00		
<b>EX</b>	.04	.10	1.00	
<b>IND</b>	.17	.53	.34	1.00

#### 4. CONCLUSION

In sum, the present scale is fairly reliable and valid. It takes into account the finer points of applicability to the Indian sociocultural scenario. Its examination from possible angles of test standardization indicates its suitability to measure the construct under consideration. However, its adequacy and appropriateness can only be established by putting it to test on a cross- section of the Indian population.

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## 6. APPENDIX

### SRQ – G

Name: ..... Class: .....

Age: ..... Boy/Girl:.....

These questions are about the reasons you do things in school. Different children will have different reasons. We want to know how true each of these reasons is for you.

#### A. When it is time to get up in the morning I most often get right out of bed.

1. Because it bothers me if I don't

	Very true	Sort of true	Not very true	Not at all true
2. Because I enjoy getting up early in the morning.				
	Very true	Sort of true	Not very true	Not at all true
3. Because I wouldn't like to lie idle in my bed.				
	Very true	Sort of true	Not very true	Not at all true
4. Because that's the rule in my house.				
	Very true	Sort of true	Not very true	Not at all true
5. Because I think it's important to get out of bed right away.				
	Very true	Sort of true	Not very true	Not at all true
6. Because it is fun getting up immediately				
	Very true	Sort of true	Not very true	Not at all true
<b>B. I usually make decisions as soon as possible.</b>				
1. Because I'll get in trouble if I don't				
	Very true	Sort of true	Not very true	Not at all true
2. Because I'll feel bad about myself if I don't				
	Very true	Sort of true	Not very true	Not at all true
3. Because I enjoy it				
	Very true	Sort of true	Not very true	Not at all true
4. Because I think it is important to make decision as soon as possible				
	Very true	Sort of true	Not very true	Not at all true
5. Because I wouldn't like to delay making decisions.				
	Very true	Sort of true	Not very true	Not at all true
6. So that others wouldn't get angry with me.				
	Very true	Sort of true	Not very true	Not at all true
7. Because it's fun to take decisions early.				
	Very true	Sort of true	Not very true	Not at all true
<b>C. I prefer to leave early for an appointment</b>				
1. Because that's what I am supposed to do				
	Very true	Sort of true	Not very true	Not at all true
2. Because I want others to like me.				
	Very true	Sort of true	Not very true	Not at all true
3. Because it bothers me when I don't				
	Very true	Sort of true	Not very true	Not at all true
4. Because I enjoy leaving early for an appointment.				
	Very true	Sort of true	Not very true	Not at all true
5. Because I think it's important to do so.				
	Very true	Sort of true	Not very true	Not at all true

6. Because I wouldn't like to be late				
Very true	Sort of true	Not very true	Not at all true	
<b>D. I often have task finished sooner than necessary</b>				
1. Because I'll get in trouble if I don't				
Very true	Sort of true	Not very true	Not at all true	
2. Because it bothers me when I don't				
Very true	Sort of true	Not very true	Not at all true	
3. Because I don't like to finish tasks at the last moment.				
Very true	Sort of true	Not very true	Not at all true	
<b>E. I wouldn't buy an essential item at the last moment.</b>				
1. So that others don't get angry when I buy an essential item at the last moment				
Very true	Sort of true	Not very true	Not at all true	
2. Because I enjoy buying essential items in time.				
Very true	Sort of true	Not very true	Not at all true	
3. Because it bothers me when I do so				
Very true	Sort of true	Not very true	Not at all true	
4. Because I think it's important to buy important items in time.				
Very true	Sort of true	Not very true	Not at all true	
5. Because I don't like to leave things till the last moment				
Very true	Sort of true	Not very true	Not at all true	
6. Because it is fun to buy essential items in time.				
Very true	Sort of true	Not very true	Not at all true	
7. Because I'll get in trouble if I do so				
Very true	Sort of true	Not very true	Not at all true	
<b>F. I usually take care of all the tasks I have to do before I settle down and relax for the evening.</b>				
1. Because my parents would scold me if I don't				
Very true	Sort of true	Not very true	Not at all true	
2. Because I'll feel bad about myself if I don't				
Very true	Sort of true	Not very true	Not at all true	
3. Because I think it's important to finish one's task in order to relax				
Very true	Sort of true	Not very true	Not at all true	
4. Because I enjoy it				
Very true	Sort of true	Not very true	Not at all true	
5. Because it bothers me if I don't do so.				
Very true	Sort of true	Not very true	Not at all true	
6. Because it's fun finishing all my work before evening.				

	Very true	Sort of true	Not very true	Not at all true
<b>G. I usually accomplish all the things I plan to do in a day</b>				
1.	Because that's the rule in my home.			
	Very true	Sort of true	Not very true	Not at all true
2.	Because I'll feel bad about myself if I don't do so			
	Very true	Sort of true	Not very true	Not at all true
3.	Because I think it's important to finish everything as planned.			
	Very true	Sort of true	Not very true	Not at all true
4.	Because I enjoy finishing all my things, as planned.			
	Very true	Sort of true	Not very true	Not at all true
<b>H. When I receive a message, I respond to it immediately.</b>				
1.	Because it bothers me when I don't			
	Very true	Sort of true	Not very true	Not at all true
2.	Because I think it's important to respond as early as possible			
	Very true	Sort of true	Not very true	Not at all true
3.	Because it's fun			
	Very true	Sort of true	Not very true	Not at all true
4.	Because I want people to like me			
	Very true	Sort of true	Not very true	Not at all true
5.	Because that's what I am supposed to do			
	Very true	Sort of true	Not very true	Not at all true
6.	Because I enjoy responding immediately.			
	Very true	Sort of true	Not very true	Not at all true



# Experimental Analysis Of Radial Heat Sink For High Power LED Application

Paper ID

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Subject Area

Mechanical Engineering

KeyWords

LED, Heat Sink, Thermal Resistance, Natural convection

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## Abstract

*It was found that light emitting diodes (LED) Janus-faced a vital downside of warmth dissipation as a result of most of input energy equipped to light-emitting diode is reborn into heat. If LED chips become hot, it will create PN junction temperature too high, which results in reduced life time and unstable light-weight emission. Many researchers attempt to solve this downside of warmth dissipation by victimisation conductor of assorted geometries. In present study cooling system is projected that primarily consist of radial conductor. The general air flow pattern is comparable to it of a chimney, it means once cool air enters from outside is heated as it passes between the fins so rises from the inner region of the warmth sink. Natural convection heat transfer at the heat sink base is validated by experimentation. In the present study cooling performance of 3 conductor profiles (LM sort pin-fin conductor, heat sink with staggered form of pin-fins, heat sink with tallest fins on outside) were analyzed by experimentation and a reference profile is set..*

## 1. INTRODUCTION

LED is a semiconductor capable of emitting light-weight once an electrical current is knowledgeable it. Unlike incandescent bulbs, where solely five-hitter of the energy used is to turn out light-weight and therefore the remaining is wasted in heat, LEDs use energy

more with efficiency. Also it has varied blessings, such as low profile and compact size makes them ideal for space-constricted applications, resistance to breakage and vibrations makes them more sturdy, good performance in cold temperatures, life time unaffected by turning them on and off frequently, do not required any tune-up time, do not contain mercury or lead, have a long life time, do not produced intense heat, as with an incandescent supply creating them safer to the bit. Along with this blessings it's some limitations additionally, because their performance is affected by however with efficiency they dissipate the warmth made and the way well their intensity is maintained over time. In LED solely 2 hundredth of the input energy is converts into light-weight energy and the remaining eightieth is converts into energy [1]. Now day's demand for high power light-emitting diode is increased. In high power LED heat generation is additionally high owing to additional power input and light-weight output. Because of this high heat generation light-emitting diode chips become hot, it will create PN junction temperature too high, which results in reduced life time and unstable light-weight emission.

Many researchers strive to solve this downside of warmth dissipation by victimisation conductor of assorted geometries. (Seung-Hwan Yu, et al. 2010) investigated experimentally and numerically the natural convection from a radial heat sink and discovered that the overall flow pattern was like that of a chimney; i.e., the air entering from outside was heated as it passed between the fins, and then rose from the inner region of warmth sink. Also the result of the range of fins, fin length, fin height, and heat flux on the thermal resistance and average heat transfer coefficient was investigated. As the number of fins, fin length and fin height increased, the thermal resistance and heat transfer coefficient typically remittent. However, there existed optimal values of the range of fins and fin length to get a good low conductor temperature. The thermal resistance decreased and the warmth transfer constant exaggerated in proportion to the warmth flux applied to the heat sink base.

(Seung-Hwan Yu et al. 2011) investigated natural convection heat transfer around a radial conductor adapted for dissipating heat on a circular light-emitting diode light-weight and optimized heat sink. To determine the optimum reference model, three sorts of conductor (L, LM and LMS) were compared. The parametric studies ware performed to compare the consequences of the amount of fins, long fin length, ratio of middle to long fin length, and heat flux on the thermal resistance and average heat transfer coefficient. Finally, optimal styles of radial heat sinks with varied heat fluxes were prompt. By comparing the thermal performance of the 3 models, the LM model was found to offer the most effective heat transfer performance.

(Seung-Jae Park et al. 2015) compared three profile of fins enclosed In-line array, Radial-direction staggered array, Theta-direction staggered array with equal masses. Among the above profile Theta-direction staggered array shows the best cooling performance. To compare the thermal performance of assorted arrays, a heat flux of 1000 W/m<sup>2</sup> was adopted for the base surface of the warmth sinks. In the case of the theta-direction staggered type array, the average heat transfer coefficient of the second row of

pin fins was thirty fifth on top of that for the opposite array sorts. Note that the second row of pin fins comes into contact with the heated air from the first row of pin fins within the in-line and radial-direction staggered arrays. However, if the second row of pin fins were to move  $\theta/4$  toward the theta direction, then it is possible to transfer heat to the cool air, improving the thermal performance. As a result, the theta direction staggered sort was selected as the conductor array for optimisation analysis.

(Daeseok Jang et al. 2014) optimized a pin-fin radial heat sink with a fin-height profile. Natural convection and radiation heat transfer were taken into account and experiment was conducted to validate the numerical model. Three profile of fins enclosed lumen sort, a pin array with tallest fins in inner region, pin-fin array with tallest fins in outer region with equal masses were compared. Among the above profile pin-fin array with tallest fins in outré shows the best cooling performance.

When fin profile with the tallest fins on outside was used in place of the lumen sort, the heat sink temperature decreased by eight.30C. Compare to the fin profile with the tallest fins on inside, the ratio of the outmost fin-area to the total fin space exaggerated by ninetieth. Under natural convection, a heat source causes the temperature of cooling air to rise, and thus the air density decreases. A flow then develops toward the heat source from the outer region. Therefore, the increased heat transfer space in the outmost region, which is the flow entrance of a radial conductor, increased the driving force of the influx. Consequently, the mass flow rate increased by forty sixth and therefore the cooling performance was improved.

In the present study cooling performance of 3 conductor profiles (LM sort pin-fin conductor, heat sink with staggered form of pin-fins, heat sink with tallest fins on outside) were analyzed by experimentation and a reference profile is set.

## 2. EXPERIMENTATION

The experimental setup shown in figure 1 is mainly consisting of heat sink, film heater, thermocouples, heat resistance glass and an insulator.

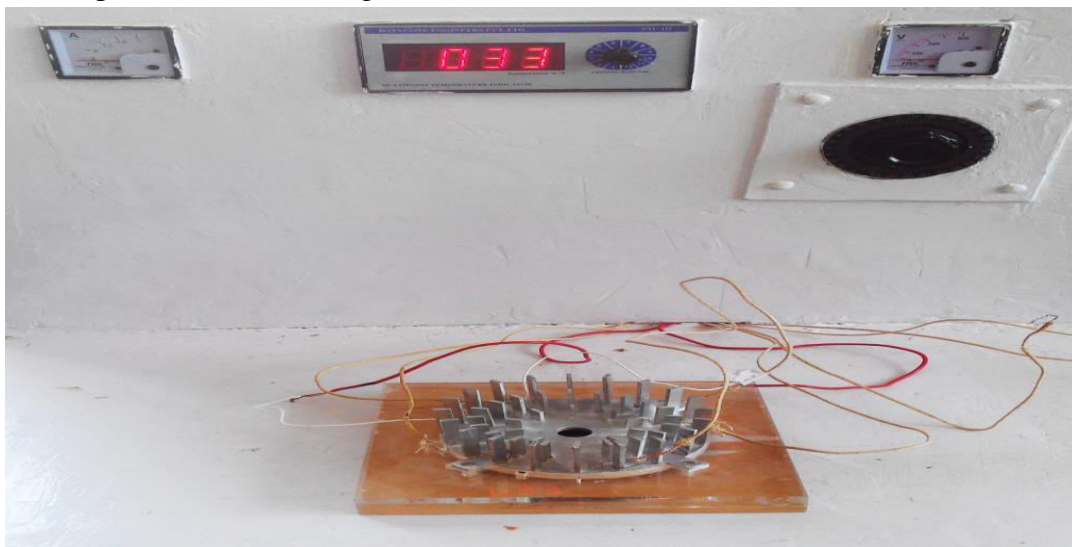
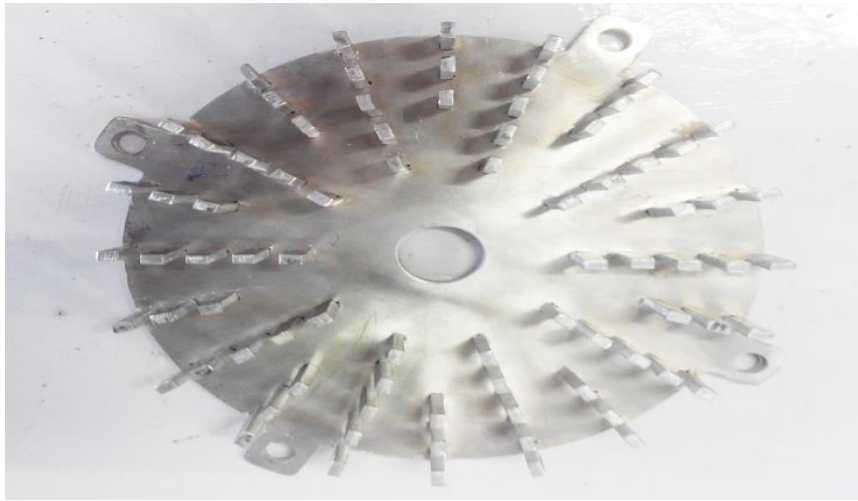


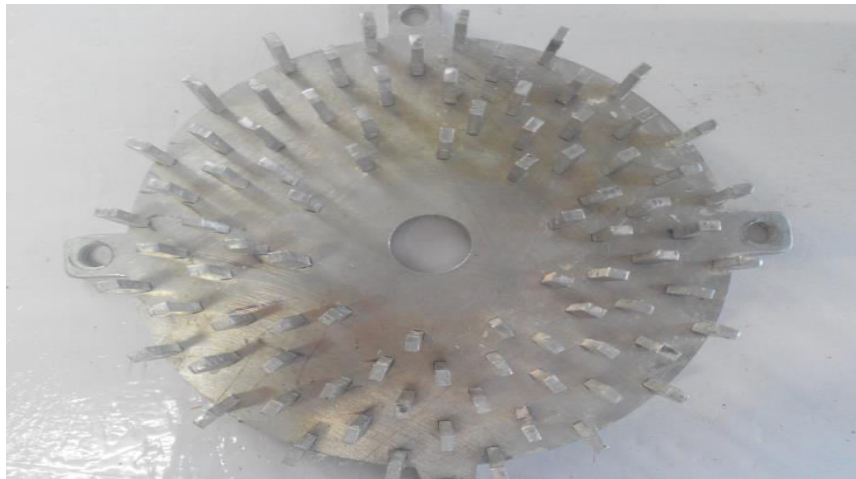
Figure 1: Experimental Set Up



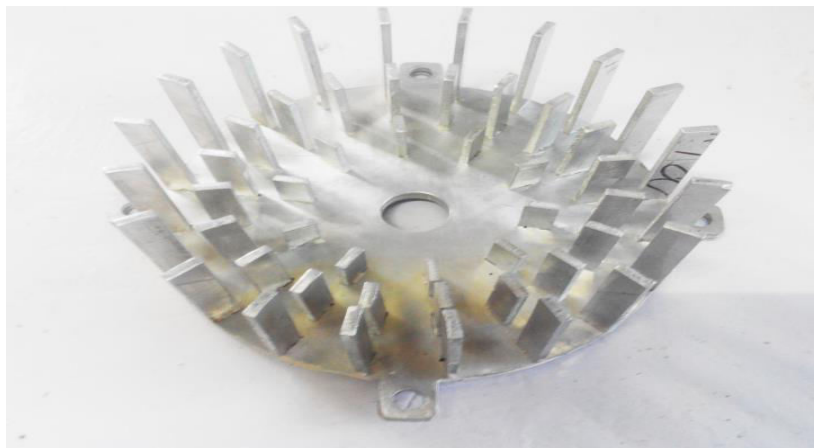
All three types of heat sinks shown in figure below are made up of pure aluminum.



**Figure 2: LM type pin-fin heat sink**



**Figure 3: Heat sink with staggered type of pin fins**



**Figure 4: Heat sink with tallest fins on outside**

The parameters of LM type heat sink are  $N=20$ ,  $L_1=45\text{mm}$ ,  $L_m=25\text{mm}$ ,  $h_f=20\text{mm}$ ,  $t_f=3\text{mm}$ ,  $r_o=75\text{mm}$ ,  $r_i=10\text{mm}$ . similarly the parameters of heat sink of staggered pin-fin type are same as that of LM type heat sink, only the difference is even number of fins are shifted anticlockwise from their original position. The parameters of heat sink with tallest fins on outside are  $N=20$ ,  $L_1=45\text{mm}$ ,  $L_m=25\text{mm}$ ,  $L_o=46\text{mm}$ ,  $L_D=15\text{mm}$ ,  $t_f=3\text{mm}$ ,  $r_o=75\text{mm}$ ,  $r_i=70\text{mm}$ .

A film heater is used to create the heat flux on base surface of heat sink. The temperature is measured with the help of eight thermocouples (k-type). Out of these five thermocouples are used to measure heat sinks temperature, two are used to measure temperature of heat resistance glass and one is used to measure atmospheric temperature. Thermal grease is used to decrease the thermal contact resistance between heat sink and film heater. To minimize the heat loss through the sides an insulator is provided around the film heater.

When temperature change was less than  $1^\circ\text{C}$  to  $2^\circ\text{C}$  over 30 minutes the heat sink temperature was assumed to have a steady state and thermal performance was calculated. Thermal resistance is used as reference parameter for comparison of thermal performance of three type of heat sink, which is defined as:

$$R_{th} = \frac{T_{avg\_heatsink} - T_\infty}{q_{heatsink\_base} * A_{heatsink\_base}}$$

Where,

$$q_{heatsink\_base} = \frac{Q_{input} - (K_{gla} * A_{gla} ((T_{gla\_up} - T_{gla\_down}) / t_{gla}))}{A_{heatsink\_base}}$$

### 3. RESULT AND DISCUSSION

Initially the thermal performance of three types of heat sinks was compared. For that purpose heat flux conditions were consider in range of  $q=300\text{w/m}^2$  to  $1000\text{w/m}^2$  which is equivalent to power consume by 18W to 50W LED light (S.-J. Park, et al, 2015).

LM type pin-fin heat sink

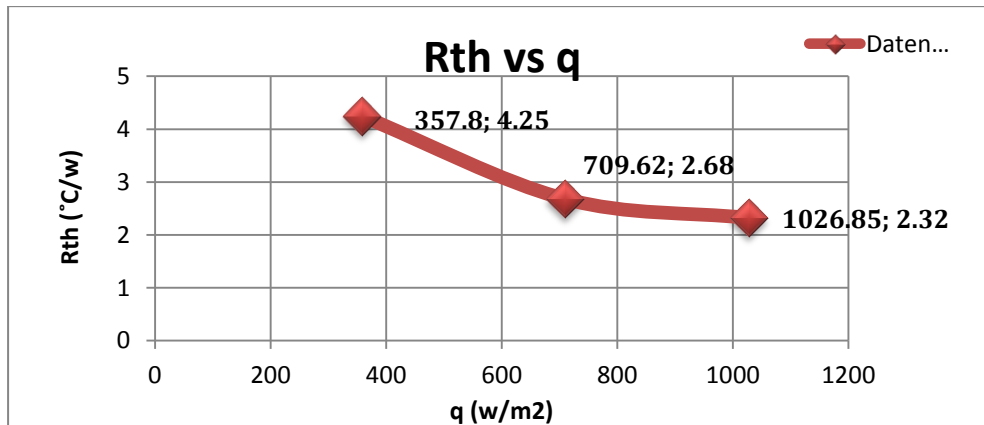


Figure 5:  $R_{th}$  vs  $q$  for LM type pin-fin heat sink



Heat sink with staggered type of pin fins

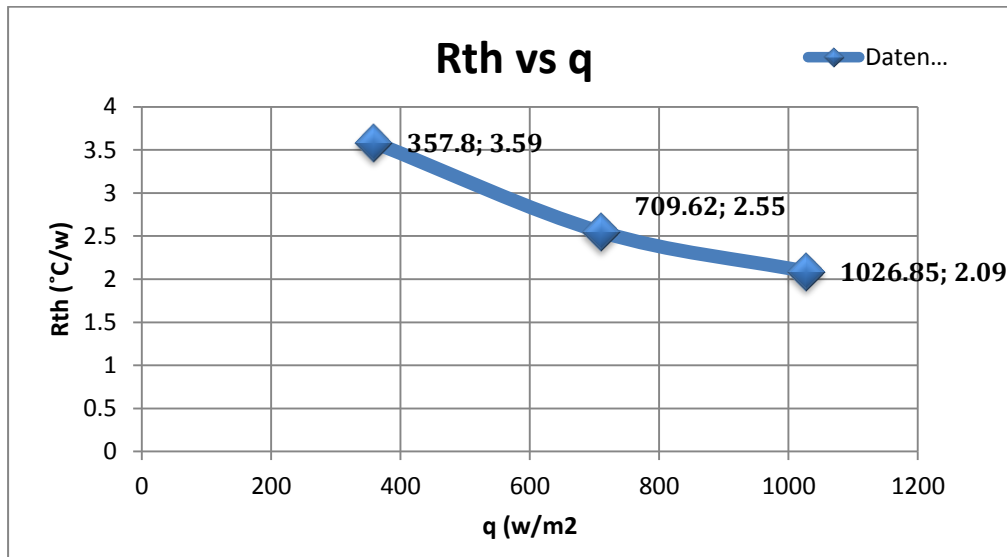


Figure 6:  $R_{th}$  vs  $q$  for Heat sink with staggered type of pin fins

Heat sink with tallest fins on outside

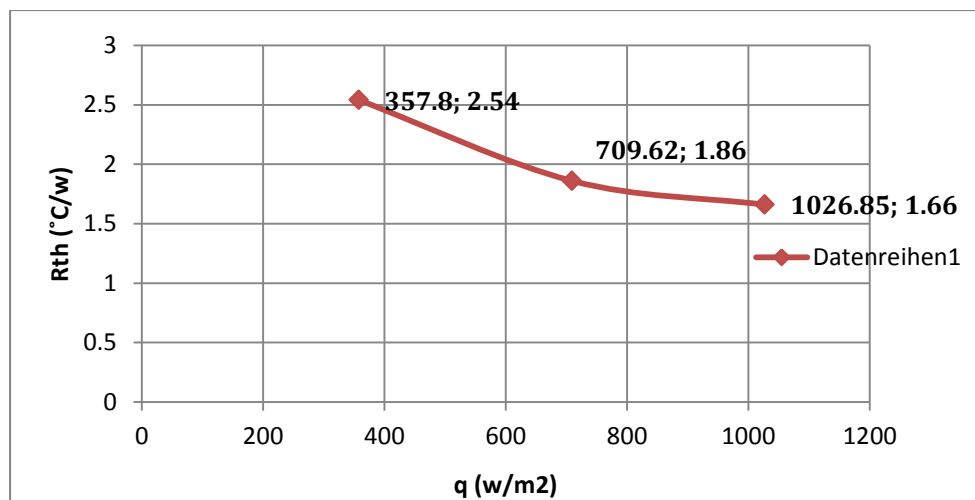
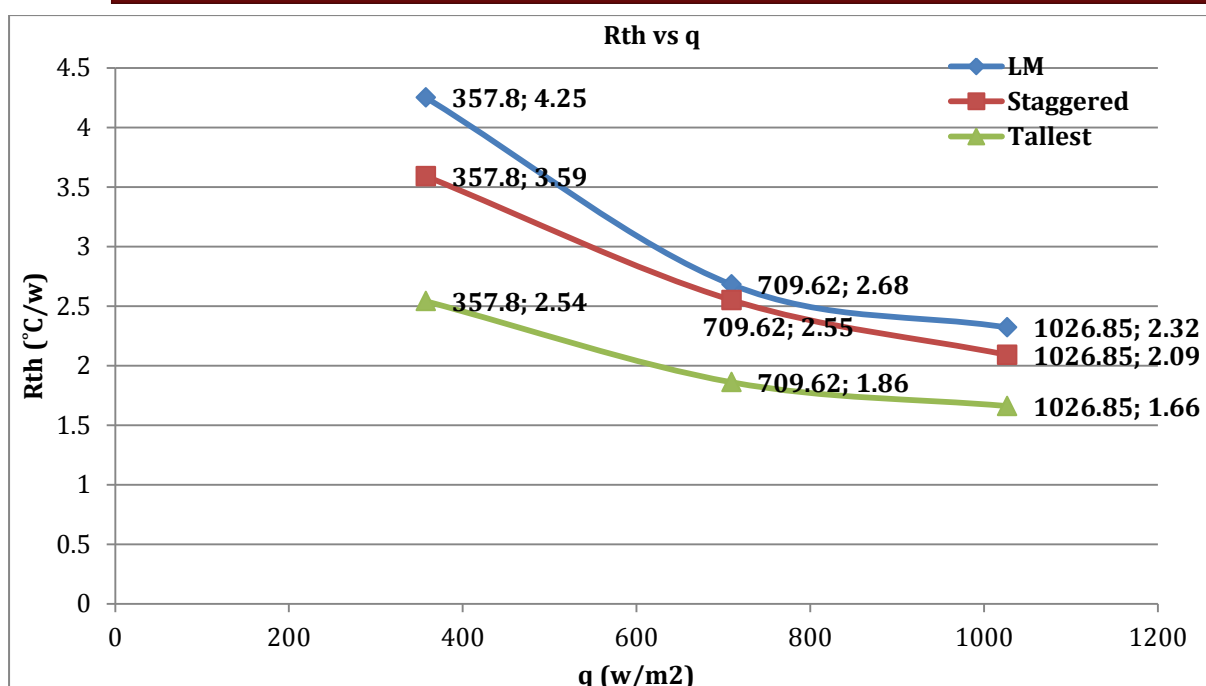


Figure 7:  $R_{th}$  vs  $q$  for Heat sink with tallest fins on outside

It was observed from above graphs, for all three type of heat sink thermal resistance ( $R_{th}$ ) is decreased with increased in heat flux ( $q$ ). When LM type pin-fin heat sink and heat sink with staggered type pin-fins was compared it was noticed that second row of fins comes into contact with heated air from the first row of fins in LM type. Whereas in staggered type of pin –fins, fins in second row was shifted from its original position, so that it was possible to transfer heat to cool air which results in improving the thermal performance.

When heat sink with tallest fins on outside compared with LM and staggered type heat sink it was observed that heat transfer area is increased in outermost region which is the flow entrance of a radial heat sink. Because of this mass flow rate of air is increased which results in improved thermal performance.



**Figure 8:  $R_{th}$  vs  $q$  for comparison of heat sinks without hollow cylinder**

As it was seen that thermal resistance is decreases with increasing heat flux for all three types of heat sink, but to determine the optimum configuration these three types of heat sinks were compare with each other with same input. After comparison it was observed that, heat sink with tallest fins on outer side shows better thermal performance as compared to LM type and staggered type heat sink. Because in heat sink with tallest fins on outer side heat transfer area is increased in outermost region which is the flow entrance of a radial heat sink. Because of this mass flow rate of air is increased which results in improved thermal performance.

**Table 1: Comparison of thermal performance of three type of heat sink at  $q=1000\text{w/M}^2$**

Type of heat sink	Thermal resistance $R_{th}$ ( $^{\circ}\text{C/w}$ ) at $q=1000\text{w/m}^2$
LM pin-fin	2.32
Staggered pin-fin	2.09
Tallest fins on outside	1.66

#### 4. CONCLUSION

As it was seen that thermal resistance is decreases with increasing heat flux for all three sorts of sink, but to confirm the optimum configuration these 3 sorts of heat sinks were compare with one another with same input. After comparison it was ascertained that, heat sink with tallest fins on outer side shows higher thermal performance ( $R_{th}=1.660\text{C/w}$ ) as compared to LM kind and staggered kind heat sink. Because in sink with tallest fins on outer facet heat transfer space is inflated in outmost region that is that the flow entrance of a radial heat sink. Because of this mass rate of air is inflated which ends up in improved thermal performance.

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# Implementation Of Brain Computer Interface Based Robotic Wheelchair

Paper ID	IJIFR/V3/ E9/ 039	Page No.	3346-3353	Research Area	Signal Processing
KeyWords	Brain Computer Interface, Direct Neural Interface, Feature Extraction , EEG, Classifiers, Wheelchair				

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## Abstract

A Brain Computer Interface (BCI), sometimes called a Mind Machine Interface (MMI), Direct Neural Interface (DNI), or Brain Machine Interface (BMI), is a direct communication pathway between the brain and an external device. BCIs are often directed at assisting, augmenting, or repairing human cognitive or sensory-motor functions. The existing system uses analog joystick, speech, SSVEP signals and eye movement to control the wheel chair. In this paper a prototype system using non-invasive brain computer interface and a wheelchair equipped with robotic systems is proposed. Feature extraction is performed using wavelet transforms and classification algorithms using neural networks. The classifier output is used to control the movement of wheelchair.

## 1. INTRODUCTION

Many different disorders can disrupt the neuromuscular channels through which the brain communicates with and controls its external environment. Amyotrophic lateral sclerosis (ALS), brainstem stroke, brain or spinal cord injury, cerebral palsy, muscular dystrophies, multiple sclerosis, and numerous other diseases impair the neural pathways that control muscles or impair the muscles themselves. They affect nearly two million people in the United States alone, and far more around the world. Those most severely affected may

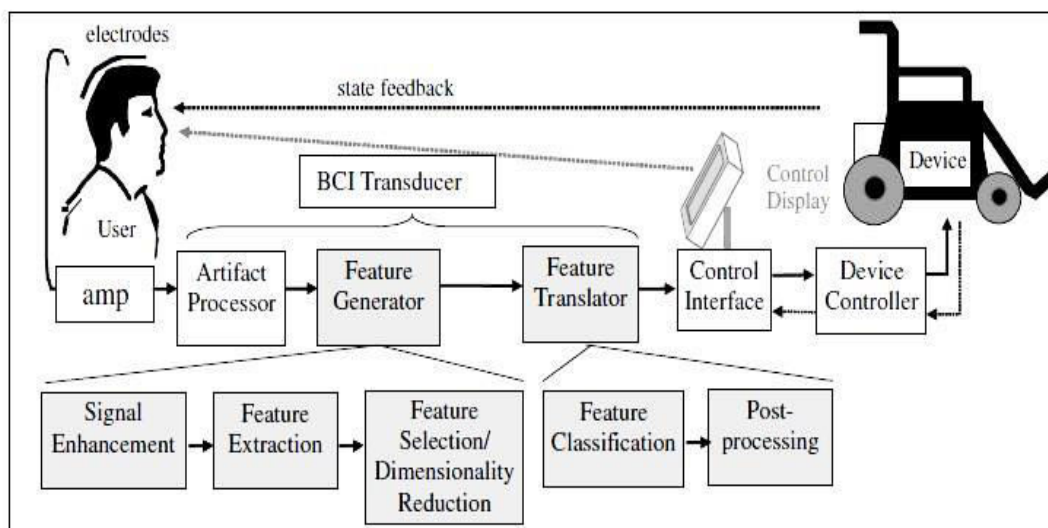
lose all voluntary muscle control, including eye movements and respiration, and may be completely locked in to their bodies, unable to communicate in any way. Modern life-support technology can allow most individuals, even those who are locked-in, to live long lives, so that the personal, social, and economic burdens of their disabilities are prolonged and severe. In the absence of methods for repairing the damage done by these disorders, there are 3 options for restoring function. The first is to increase the capabilities of remaining pathways. Muscles that remain under voluntary control can substitute for paralyzed muscles. People largely paralyzed by massive brainstem lesions can often use eye movements to answer questions, give simple commands, or even operate a word processing program; and severely dysarthric patients can use hand movements to produce synthetic. The second option is to restore function by detouring around breaks in the neural pathways that control muscles. In patients with spinal cord injury, electromyography (EMG) activity from muscles above the level of the lesion can control direct electrical stimulation of paralyzed muscles, and thereby restore useful movement. The final option for restoring function to those with motor impairments is to provide the brain with a new, non-muscular communication and control channel, a direct brain-computer interface (BCI) for conveying messages and commands to the external world. The BCI systems can be categorized: invasive and non-invasive categories. In invasive systems, electrodes are implanted into brain tissues. This technique is used on animals. In non-invasive systems, the brain activities are recorded via electroencephalography (EEG) from the scalp of a subject. In this case, the EEG electrodes are placed on the scalp and conductive gel is applied between each electrode and the scalp. The EEG can measure the activities of millions of brain cells. The recording by this method is convenient, safe, and inexpensive. The most important advantage of (EEG) signal is that being a non-invasive technique it does not harm the person.

Brain computer interface (BCI) facilitates a connection between the human brain and external device like a computer. The BCI system can be used for assisting the physically disabled and impaired people. The BCI system requires analysis, monitoring, measurement, and evaluation of electrical activity of the brain which is extracted by either a set of electrodes over the scalp or electrodes implanted inside the brain. This field has gained enormous popularity during the last few years. The Brain Computer Interface (BCI) systems enable people suffering from severe neuromuscular disorders to operate devices and applications through their mental activities. Bio-signals can be acquired from an organ or a nervous system. The Brain Computer Interface (BCI) system involves recording and analyzing the Electro-Encephalogram signals from brain using electrodes. It should be noted that the EEG signal indicates the electrical potential differences corresponding to different emotions generated by human brain.

The research areas like psychology, neuro-physiology and BCI are focusing on the important indication of emotions using EEG signals. A BCI can be functionally described as illustrated in the above figure. Monitoring of the user's brain activity results in brain signals (e.g. electric or hemodynamic brain activity indicators), which are processed to



obtain features that can be grouped into a feature vector. The latter is translated into a command to execute an action on the BCI application (e.g. wheelchair, cursor on the screen, spelling device). The result of such an action can be perceived by the user who can modulate her/his brain activity to accomplish her/his intents.



**Figure 1: General Block Diagram [6].**

In [1] a new scheme in collaborating non-invasive brain computer interface (BCI) and a wheelchair equipped with robotic systems. The BCI system implements steady state visual evoked potential (SSVEP) method that extracts features from electro-encephalography (EEG) signals in determining the intentions or commands from human-brain. In [2] a Brain - Computer Interfaces is used to facilitate rehabilitation training of a patient who has lost motor functions. Brain Computer Interface would be connected to the computer controlled robotic glove based on signals acquired during imaginary movements through this interface. In [3] a robotic wheelchair using only a pan-tilt-zoom camera is proposed for developing a robotic system which enables a user to navigate in complex environment at low cost. In [4] they have used an emotion based BCI control system. A signal acquisition system is equipped with an emotive EPOC headset which aligns, band pass filters and digitizes the signals and transmits it directly to the computer. It is then interfaced with an autonomous vehicle which can be used by people with motor disabilities.

## 2. STEPS INVOLVED IN THE SYSTEM

### 2.1 Data Acquisition

The EEG signals can be recorded in real time using an EEG cap with a certain number of set electrodes that can extract signals based on the electrical potential difference produced in the brain or pre-recorded signals can be utilized for the purpose of analyzing. Recording is done by placing electrodes at different points on the scalp or the surface of the brain or neuronal activity recorded within the brain. The main source of these signals

is the pyramidal cells on the brain which produce brain waves with higher amplitude compared to other cells.

The EEG signals can be classified into 4 major categories: Alpha (9 – 13 Hz), Beta (14 – 30 Hz), Theta (4 – 8 Hz), Delta (1 – 3 Hz). The signals are as shown in the figure. The data acquisition refers to the collection of raw EEG data which is a mixture of all the above mentioned signals.

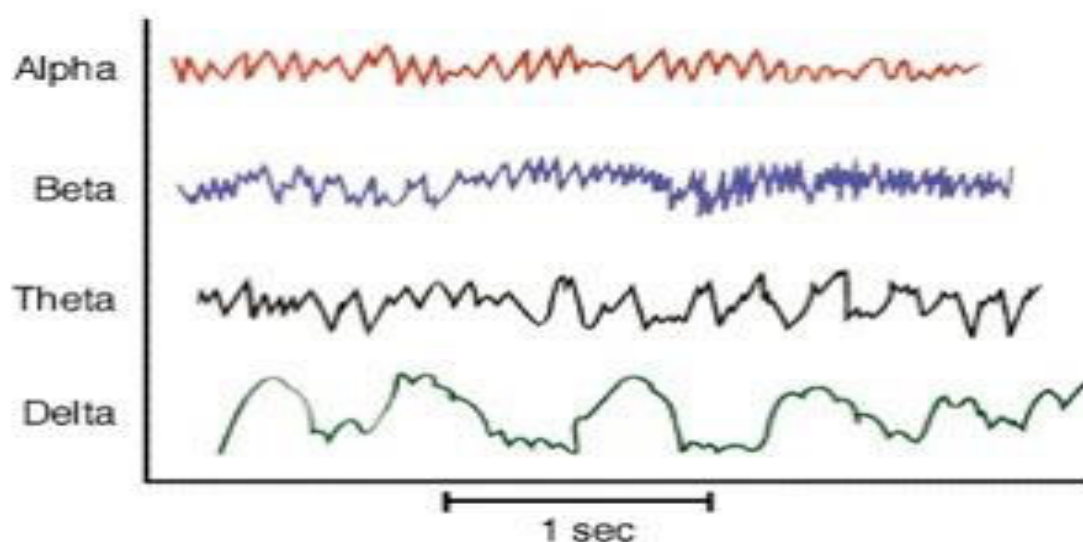


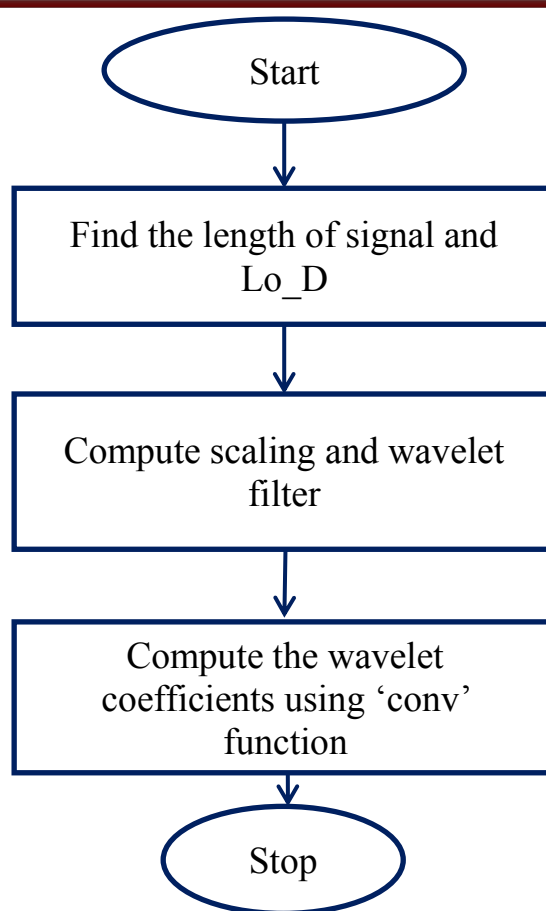
Figure 2: Various EEG signals.

## 2.2 Pre Processing

The recorded data is subjected to pre-processing operations like filtering out the required frequency levels. This usually occurs within the EEG cap which has filters embedded within it. Since the EEG data required for motor movements lies in the beta waves, a band pass or a Butterworth filter can be used to isolate the required signals. The filtering basically removes the unwanted electrical disturbances generated through the power line and various other forms of interferences. The raw EEG signal data is obtained from “physionet.org”, the signals obtained includes acquired EEG data from five healthy subjects performing various real and imaginary movements.

## 2.3 Feature Extraction

This stage is essentially one of the primary stages of the processing. Feature extraction is a special form of dimensionality reduction. When the input data to an algorithm is too large to be processed and it is suspected to be notoriously redundant then the input data will be transformed into a reduced representation set of features (also named features vector). Transforming the input data into the set of features is called feature extraction. Figure 3 represents the flow in the feature extraction stage. If the features extracted are carefully chosen it is expected that the features set will extract the relevant information from the input data in order to perform the desired task using this reduced representation instead of the full size input.

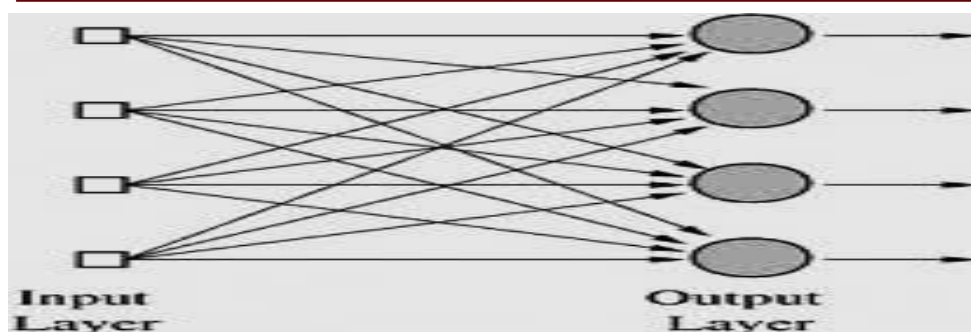


**Figure 3: Flowchart representing Feature Extraction.**

It refers to acquiring a desired part of the signal from multiple samples which are obtained after the pre-processing stages. This is essential as the data obtained after pre-processing operations contain a variety of neuro-dynamics like cortical idle rhythms, muscular jerks, etc. The digitized signals are then subjected to one or more of a variety of feature extraction procedures. Wavelet transforms are considered for feature extraction as they are more ideal compared to other methods such as Histograms or Fourier transforms. Orthogonal wavelets are used for this procedure. Discrete wavelet transform operation when performed with the signal under consideration yields a set of wavelet coefficients. It is seen that signals from particular electrodes concerned with motor movement are taken to increase the overall accuracy.

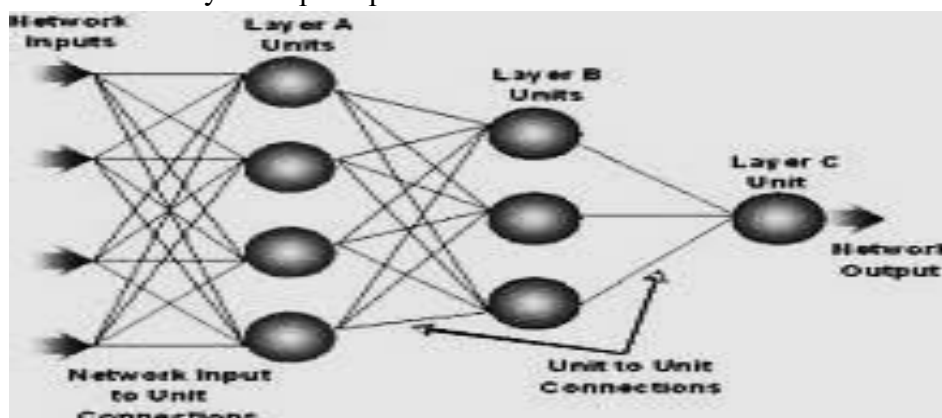
#### **D. Classification**

Once the feature extraction is completed, the obtained coefficients are classified into various classes. A linear classifier is preferred for the applications such as wheelchair because of the knowledge of input. Four classes are assigned four basic functions which control the movement of wheelchair. Figure 4 shows the representation of a single layered feed forward network. Figure 6 shows the flowchart of classification according to various threshold targets set.



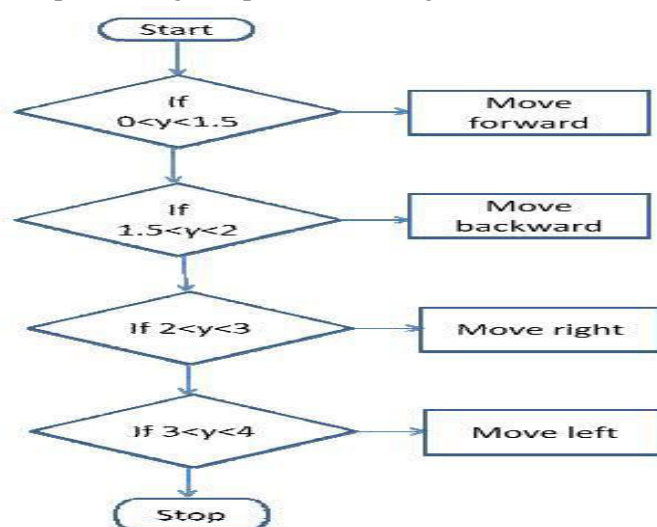
**Figure 4: Single layer feed forward network.**

Multilayer feed forward network is used which initializes weights to each layer of the network and trains the given input to achieve a target value. A multilayer feed forward neural network is an interconnection of perceptron's in which data and calculations flow in a single direction, from the input data to the outputs. The number of layers in a neural network is the number of layers of perceptron's.



**Figure 5: Multilayer feed forward network.**

The network in figure 5 illustrates this type of network. Hence, any signal results in an output that matches the target value performing an operation as assigned to the classified outputs.



**Figure 6: Flowchart representing classification.**



### 3. HARDWARE SETUP

Figure 7 shows the basic hardware setup of the device. A controller is programmed to control the movements of the wheelchair which is based on the classified outputs. A Zigbee transceiver is embedded on the device to receive the inputs to controller which generates movements using a motor driver. The inputs are the classes created for the movement of the wheelchair in forward, backward, right and left movements respectively.

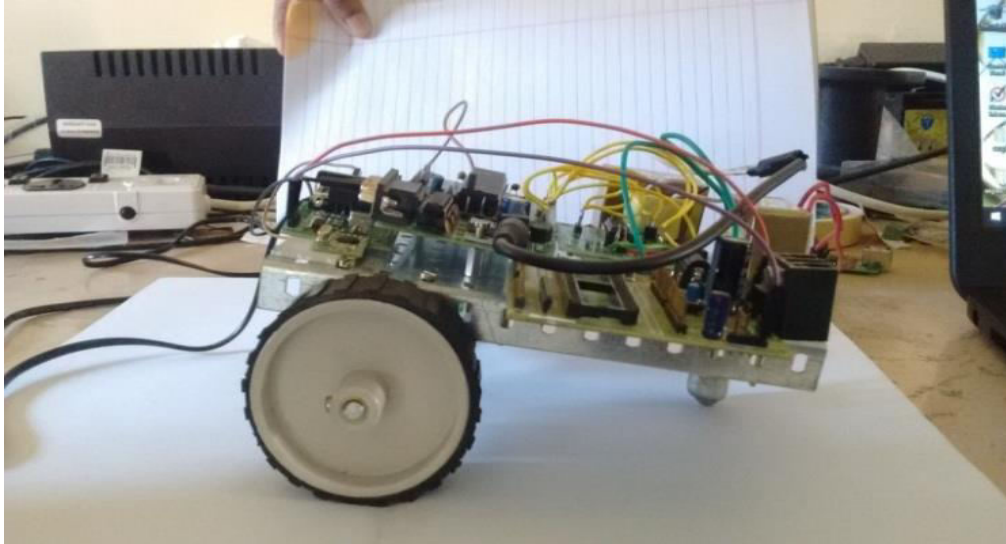


Figure 7: Hardware Assembly

### 4. RESULTS AND ANALYSIS

Recorded EEG signals from five subjects were used for the signal classification. The signals corresponded to basic movements such as opening and closing of fists and feet for both real and imaginary movements. Once the Feature extraction stage is done, the movements are classified into various classes by setting a threshold value. From targets 0 to 1.5, 1.5 to 2, 2 to 3 and 3 to 4 the movements are front, back, right and left respectively. Any value which exceeds the threshold would result in no action by the device.

It is seen that the Feed forward Network used gives up to 80 % accuracy after training. This makes it more efficient to use artificial neural networks over the traditional methods like facial recognition. Further, it is seen that the applications can be extended to other fields such as emotion detection.

### 5. CONCLUSION

In this work, the method for control of the electric wheelchair using Brain Computer Interface (BCI) was introduced. This method is based on classification of EEG signals which were acquired from available database. The EEG data corresponds to five different subjects who were made to perform different tasks. There are four commands implemented (left, right, forward and backward), induced by various motor tasks: (1) real and imaginary movements of opening and closing the fist. (2) real and imaginary movements of opening and closing the fist and feet. So there was developed an algorithm to extract features from the EEG data using discrete wavelet transform and classify the



extracted features using multilayer feed forward networks. The classified output is transmitted to the microcontroller which is placed on the wheelchair prototype through Zigbee transceiver based on which the wheelchair prototype moves in four different directions. The achieved results basically fulfilled the expected outputs to a greater extent. It was found that the accuracy of the classifier algorithm was 78.5%.

Future progress hinges on attention to a number of crucial factors which include the selection of proper feature extraction method and classifying algorithm for better accuracy. Also this has to be seen an interdisciplinary problem, involving neurobiology, psychology, engineering, mathematics, computer science, and clinical rehabilitation. With adequate recognition and effective engagement of these issues, BCI systems could provide an important new communication and control option for those with disabilities that impair normal communication and control channels.

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## 7. BIOGRAPHIES



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# Audio Steganography Using Modified LSB Algorithm And ECC For Security

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Research Area

Audio  
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## Abstract

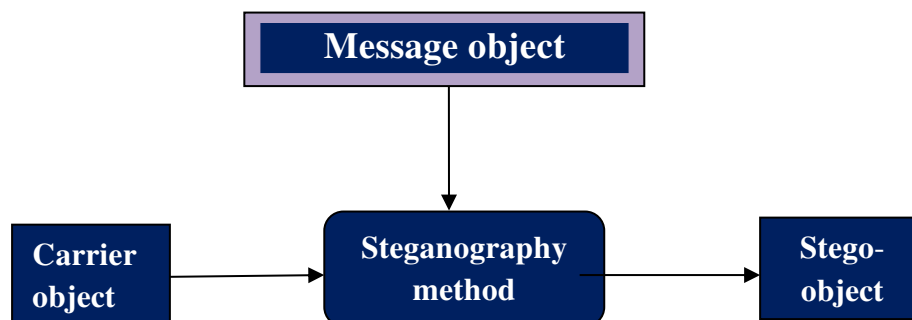
*In the current internet community, secure data transfer is limited due to its attack made on data communication. So more robust methods are chosen so that they ensure secured data transfer. One of the solutions which came to the rescue is the audio Steganography. But existing audio Steganography systems have poor interface, very low level implementation, difficult to understand and valid only for certain audio formats with restricted message size. Enhanced Audio Steganography (EAS) is one proposed system which is based on audio Steganography and cryptography, ensures secure data transfer between the source and destination. EAS uses most powerful encryption algorithm in the first level of security, which is very complex to break. In the second level it uses a more powerful modified LSB (Least Significant Bit) Algorithm to encode the message into audio. It performs bit level manipulation to encode the message. The basic idea behind this paper is to provide a good, efficient method for hiding the data from hackers and sent to the destination in a safer manner. Though it is well modulated software it has been limited to certain restrictions. The quality of sound depends on the size of the audio which the user selects and length of the message. Though it shows bit level deviations as a whole the change in the audio cannot be determined.*

## 1. INTRODUCTION

The desire to send a message as safely and as securely as possible has been the point of discussion since time immemorial. Information is the wealth of any organization. This makes security-issues top priority to an organization dealing with confidential data. Whatever is the method we choose for the security purpose, the burning concern is the degree of security. Steganography is the art of covered or hidden writing [1]. The purpose of Steganography is covert communication to hide a message from a third party.

. Steganography in the modern day sense of the word usually refers to information or a file that has been concealed inside a digital Picture, Video or Audio file. Steganography essentially exploits human perception since human senses are not trained to look for files that have information hidden inside of them.

Generally, in Steganography, the actual information is not maintained in its original format and thereby it is converted into an alternative equivalent multimedia file like image, video or audio which in turn is being hidden within another object. This apparent message (known as cover text in usual terms) is sent through the network to the recipient, where the actual message is separated from it. In practice there are three types of Steganography protocols used. They are Pure Steganography, Secret Key Steganography and Public Key Steganography. Pure Steganography is defined as a Steganography system that does not require the exchange of a cipher such as a stegokey [3]. There are two inputs, carrier object and message object. The Steganography algorithm is used to embed message object onto carrier object. The main criteria for this embedding is no third party observer can see, listen or suspect about the message. It should lie in secret. Different types of objects can be used as carrier and message object. It can be Image, Text, audio and video. As shown in Fig.1 the secret information i.e., the Message object is embedded in the carrier object using some Steganography method to obtain the stego object.



**Figure 1: General Steganography Block Diagram**

### 1.1 Audio Steganography

Embedding secret messages into digital sound is known as audio Steganography. It is usually a more difficult process than embedding messages in other media. Audio Steganography methods can embed messages in WAV, AU, and even MP3 sound files. The properties of the human auditory system (HAS) are exploited in the process of audio Steganography. Auditory perception is based on the critical band analysis in the inner ear

where a frequency-to-location transformation takes place along the basilar membrane. The power spectra of the received sounds are not represented on a linear frequency scale but on limited frequency bands called critical bands. [4]

Digital audio is discrete rather than continuous signal as found in analog audio. A discrete signal is created by sampling a continuous analog signal at a specified rate. For example, the standard sampling rate for CD digital audio is about 44 kHz. Digital audio is stored in a computer as a sequence of 0's and 1's. With the right tools, it is possible to change the individual bits that make up a digital audio file. Such precise control allows changes to be made to the binary sequence that are not discernible to the human ear.

In the digital domain, PCM (Pulse Code Modulation) is the most straightforward mechanism to store audio. The analog audio is sampled in accordance with the Nyquist theorem and the individual samples are stored sequentially in binary format. The wave file is the most common format for storing PCM data and the WAVE file format is a subset of Microsoft's RIFF specification for the storage of multimedia files. The secret message is embedded by slightly altering the binary sequence of a sound file. Existing audio Steganography software can embed messages in WAV, AU, and even MP3 sound files [5]. Embedding secret messages in digital sound is usually a more difficult process than embedding messages in other media, such as digital images. In order to conceal secret messages successfully, a variety of methods for embedding information in digital audio have been introduced. These methods range from rather simple algorithms that insert information in the form of signal noise to more powerful methods that exploit sophisticated signal processing techniques to hide information. The lists of methods that are commonly used for audio steganography are listed below.

- LSB coding
- Parity coding
- Phase coding
- Spread spectrum
- Echo hiding

## 1.2 LSB Coding

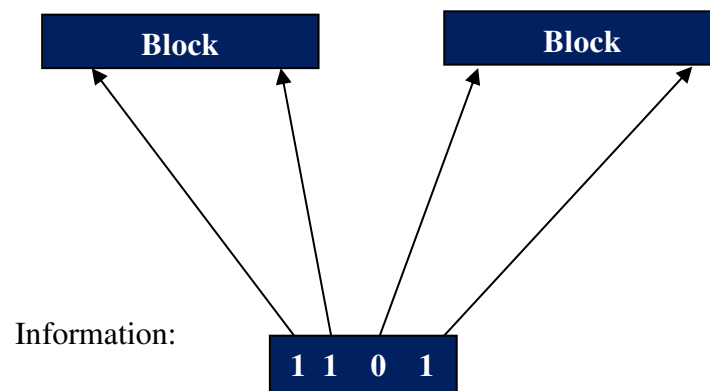
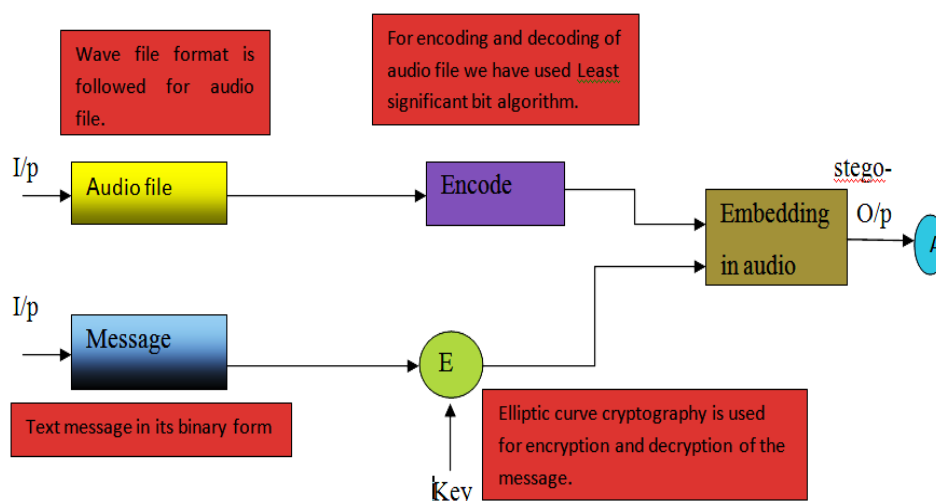


Figure 2: LSB coding

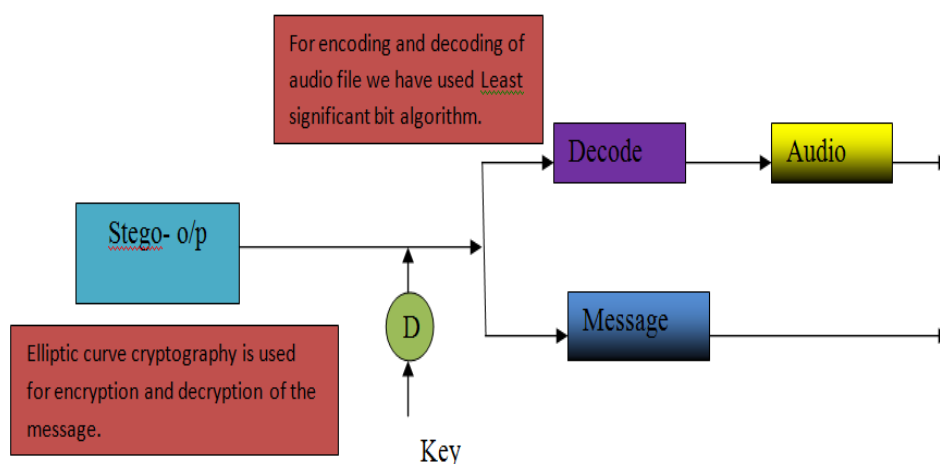


## 2. IMPLEMENTATION

Enhanced Audio Steganography (EAS) is one proposed system which is based on audio Steganography and cryptography, ensures secure data transfer between the source and destination. EAS uses most powerful encryption algorithm in the first level of security, which is very complex to break. In the second level it uses a more powerful modified LSB (Least Significant Bit) Algorithm to encode the message into audio. It performs bit level manipulation to encode the message. The basic idea behind this paper is to provide a good, efficient method for hiding the data from hackers and sent to the destination in a safer manner. Though it is well modulated software it has been limited to certain restrictions. The quality of sound depends on the size of the audio which the user selects and length of the message. Though it shows bit level deviations in the frequency chart, as a whole the change in the audio cannot be determined.



**Figure 2: Basic Block Diagram Of Audio Steganography at the transmitter end**



**Figure 2: Basic Block Diagram Of Audio Steganography at the receiver end**

The above block diagram (fig2& fig3) represents the audio Steganography transmitter and receiver ends respectively. For encoding and decoding of audio file we have used least significant bit algorithm (LSB) and Elliptic Curve Cryptography (ECC) is used for encryption and decryption purpose.

## 2.1 LSB Modification Technique

LSB coding is one of the earliest techniques studied in the information hiding and watermarking area of digital audio. It is one of the earliest and simplest Steganography techniques and, as in cases of other known algorithms; it has first been developed for watermarking of images and video stream. In LSB coding technique least significant bit is modified to embed data. The flowchart of the algorithm is given as follows (Fig4 ).

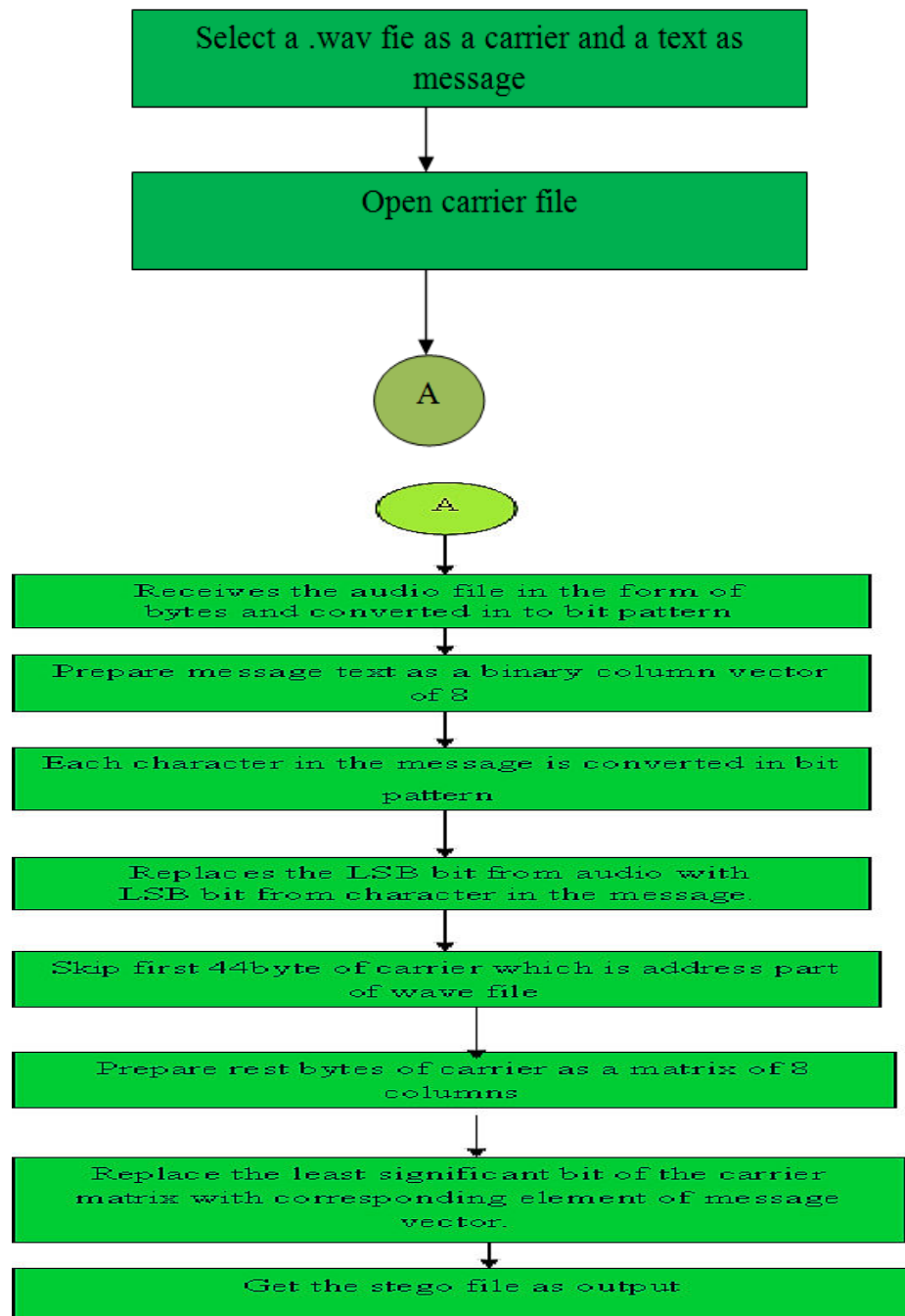


Figure 4: Flowchart of LSB modifications Technique for Audio Steganography

### 3.2 Elliptic Curve Cryptography

The rapid progress in wireless mobile communication technology and personal communication systems has prompted new security questions. Since open air is used as the communication channel, the content of the communication may be exposed to an eavesdropper, or system services can be used fraudulently. In order to have reliable proper security over the wireless communication channel, certain security measures need to be provided. The mobile environment aggravates some of the security concerns and threats. Mobile users will use resources at various locations and may be provided by different service providers. Integrity and confidentiality of information stored on the mobile appliance is another important concern. ATM machines and storage of medical records require efficient encryption algorithm, which uses low processing power.

The vast majority of the products and standards that use public-key cryptography for encryption and digital signatures use RSA. As we have seen, the bit length for secure RSA use has increased over recent years, and this has put a heavier processing load on applications using RSA. This burden has ramifications, especially for electronic commerce sites that conduct large numbers of secure transactions. Recently, a competing system that has emerged is elliptic curve cryptosystem (ECC).

Elliptic Curve Cryptography is a public key cryptography. In public key cryptography each user or the device taking part in the communication generally have a pair of keys, a public key and a private key, and a set of operations associated with the keys to do the cryptographic operations. Only the particular user knows the private key whereas the public key is distributed to all users taking part in the communication. Some public key algorithm may require a set of predefined constants to be known by all the devices taking part in the communication. Domain parameters in ECC are an example of such constants. Public key cryptography, unlike private key cryptography, does not require any shared secret between the communicating parties but it is much slower than the private key cryptography. The mathematical operation of ECC is defined over the elliptic curve (equ 1.1).

$$y = x^3 + ax + b \quad \dots\dots\dots (1.1)$$

Where  $4a + 27b \neq 0$ . Each value of the 'a' and 'b' gives a different elliptic curve. All points (x, y) which satisfies the above equation plus a point at infinity lies on the elliptic curve. The public key is a point in the curve and the private key is random number. The public is obtained by multiplying the private key with the generator point G in the curve. Generator point G, parameters 'a', 'b' and some another constants constitutes with domain parameter of ECC. For the secure file transfer by using Steganography, we propose a conceptual scheme. Consider Alice as sender and Bob is a receiver. Alice wants to transfer secrete file for Bob over a network. Fig.8 and Fig.9 describe the flowchart of ECC algorithm for encryption and decryption.

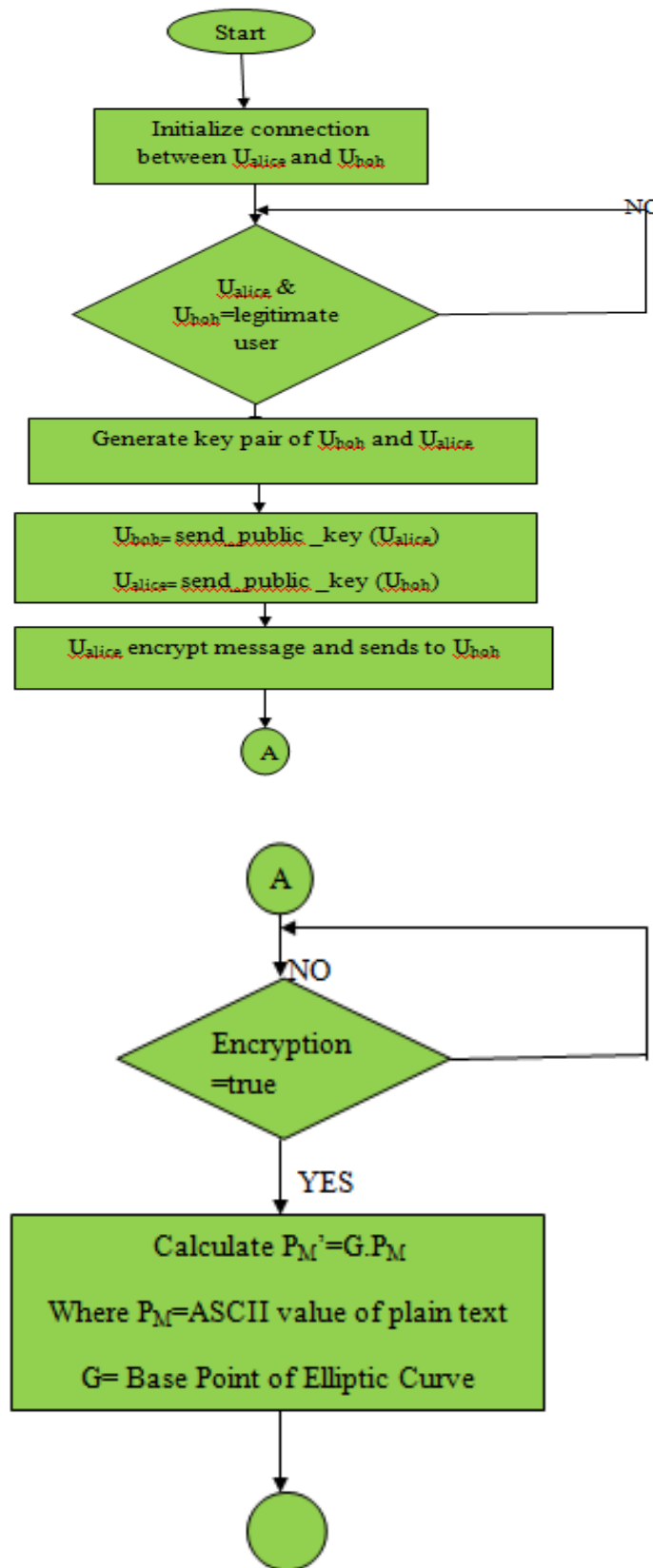


Figure 8: ECC Algorithm



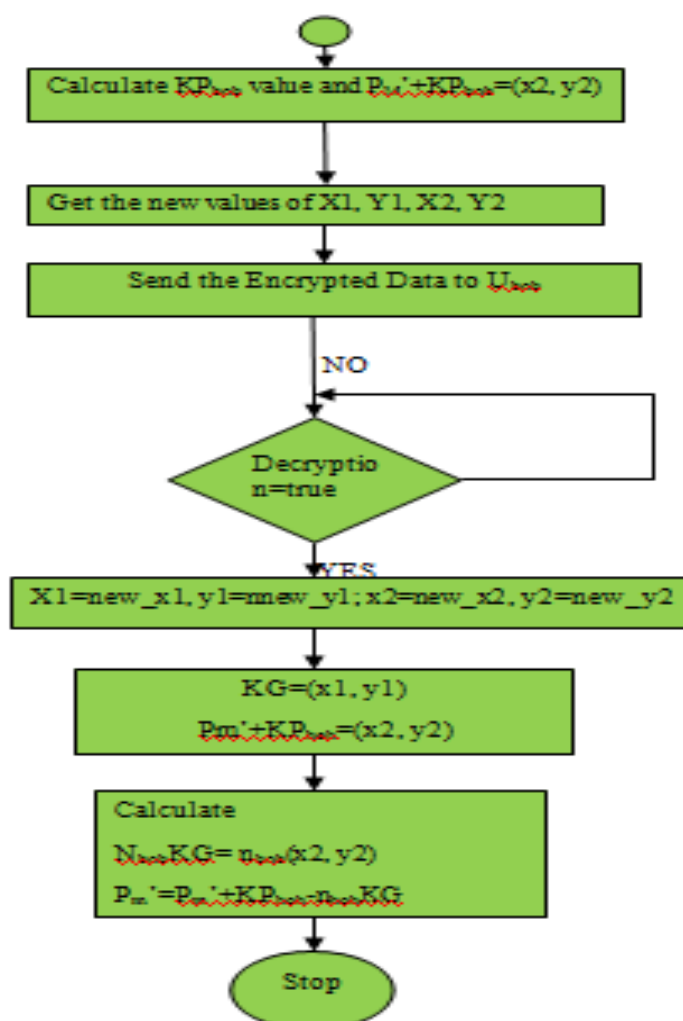


Figure 9: ECC Algorithm (Contd...)

## 4. RESULTS

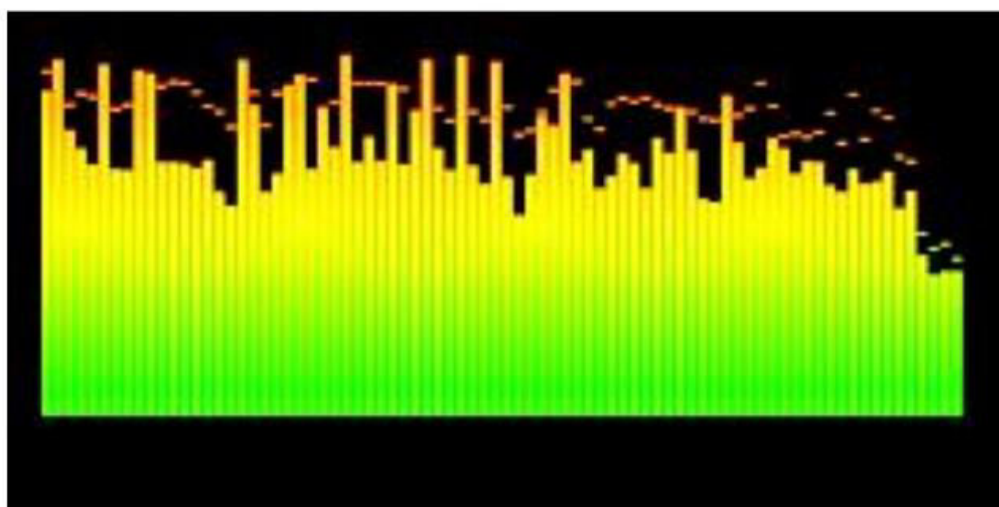
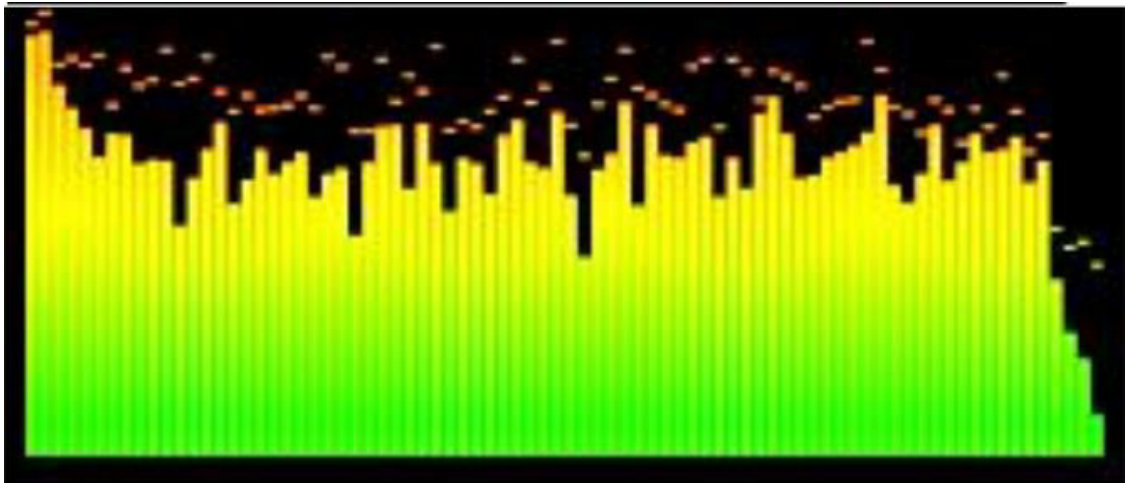


Figure 10: Audio Carrier File Before Embedding Text Message.



**Figure 11: Audio Carrier File After Embedding Text Message**

As we can observe, the audio carrier file varies with only slight difference after embedding message from the original audio signal. Though there is difference but it is not detectable by human ear.

## 5. CONCLUSION

Hiding information may introduce enough visible noise to raise suspicion. Therefore the carrier or cover audio must be carefully selected. A cover audio should contain some randomness. It should contain some natural uncertainty or noise. Once it has been used, the audio should be used again and should be destroyed. A familiar audio should be used. It is better for the steganographer to create own audios. This proposed system is to provide a good, efficient method for hiding the data from hackers and sent to the destination in a safe manner. This proposed system will not change the size of the file even after encoding and also suitable for any type of audio file format.

Encryption and Decryption techniques have been used to make the security system robust. The project is being well made to tackle the security issues and user interface makes user to handle well the system and provides good communication between user and the system. The encrypt key makes further security and available of different audio formats to choose by the user makes project a valuable project. As the encoding method varies dynamically, it can't be determined and hence even when the existence of message is detected, it can't be read. To a steganalysis expert unable to determine the chosen encoding, a bit is just a bit. A better function can be determined to improve the ability of the technique. Combining still more steganography methods may improve the strength of the technique. Future Work: We are going to implement this application for compressed audio file formats and large audio files by using same technique.

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# Highly Total Prime Labeling

Paper ID	IJIFR/V3/ E9/ 043	Page No.	3364-3374	Subject Area	Mathematics
KeyWords	Prime Labeling, Total Prime Labeling, Highly Total Prime Labeling				

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## Abstract

Prime labeling was introduced by T.Deretsky, S.M.Lee, and J.Mitchem in 1991[1] and [2]. Total Prime labeling was introduced by M.Ravi @ Ramasubramanian and R.Kala in 2012[3]. A graph  $G(V,E)$  is said to have a total prime labeling if its vertices and edges can be labeled with distinct integers from  $\{1,2,..., p+q\}$  such that for each vertex of degree at least 2, the greatest common divisor of the labels on its incident edges is 1. This paper introduces a slightly modified version of the above said labeling. A highly total prime labeling of a graph  $G$  is an injective function  $f: V \cup E \rightarrow \{1,2,3,..., p+q\}$  such that any pair of adjacent edges receive relatively prime labelings. Properties of this labeling are studied and some common families such as paths, cycles, coronas, two cycles with one common edge are proved to be highly total prime.

## 1. INTRODUCTION

Total Prime labeling was introduced by M.Ravi @ Ramasubramanian and R.Kala in 2012[3]. We introduce a slightly modified version of the above said labeling as highly total prime labeling. Some Common families such as paths, cycles, coronas, and two cycles with one common edge are proved to be highly total prime. Some other families of graphs have been proved not to be highly total prime.

## 2. DEFINITION

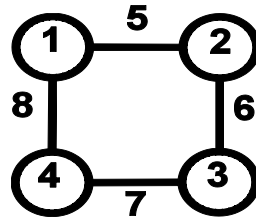
Let  $G=(V, E)$  be a graph with  $p$  vertices and  $q$  edges. A bijection  $f: V \cup E \rightarrow \{1,2,3,...,p+q\}$  is said to be a Highly total prime labeling if

- (i) for each edge  $e = uv$ , the labels assigned to  $u$  and  $v$  are relatively prime.

- (ii) Any pair of adjacent edges receives relatively prime labeling.  
 A graph which admits highly total prime labeling is called Highly Total Prime Graph.

### 2.1 Example

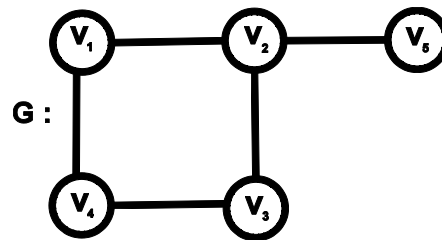
$C_4$  is a Highly Total Prime Graph



### 2.2 Definition

A set of points in  $G$  is independent if no two of them are adjacent. The largest number of points in such a set is called the point independence number of  $G$  and is denoted by  $\beta_0(G)$  or  $\beta_0$ .

### 2.3 Example



$$V(G) = \{v_1, v_2, v_3, v_4, v_5\}$$

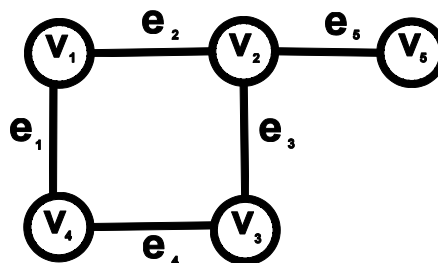
$S = \{v_1, v_3, v_5\}$  is a maximum independent set.

Independence number of  $G$  is 3.

### 2.4 Definition

An independent set of lines of  $G$  has no two of its lines adjacent and the maximum cardinality of such a set is the line independence number  $\beta_1(G)$  or  $\beta_1$ .

### 2.5 Example



$$V(G) = \{v_1, v_2, v_3, v_4, v_5\}, E(G) = \{e_1, e_2, e_3, e_4, e_5\}$$

$S = \{e_4, e_5\}$  is a maximum independence set



Independence number of  $G$  is 2.

## 2.6 Theorem

If a connected graph  $G$  is highly total prime, then  $\beta_0 + \beta_1 \geq \left\lceil \frac{p+q}{2} \right\rceil$  where  $\beta_0$  is the point independence number of  $G$ ,  $\beta_1$  is the line independence number of  $G$ ,  $p$  is the number of vertices of  $G$  and  $q$  is the number of edges of  $G$ .

**Proof:**

Let  $G$  be a connected graph which is highly totally prime. Then there is an injective function  $f : V \cup E \rightarrow \{1, 2, 3, \dots, p+q\}$  such that any two adjacent vertices receive relatively prime labels and any two adjacent edges receive relatively prime labels.

There are  $\left\lceil \frac{p+q}{2} \right\rceil$  even integers in  $\{1, 2, 3, \dots, p+q\}$ . The edges with even labels should be a matching of  $G$  and the collection of evenly labelled vertices should form an independent set of  $G$ .

$\beta_0$  is the size of maximum independent set and  $\beta_1$  is the size of maximum matching.

$$\text{Hence } \left\lceil \frac{p+q}{2} \right\rceil \leq \beta_0 + \beta_1.$$

## 2.7 Theorem

Complete graphs  $K_n$  ( $n \geq 3$ ) are not highly total prime.

**Proof:**

Let  $K_n$  denote complete graph with  $n$  vertices.

$$p = n, q = \binom{n}{2}, \beta_0(K_n) = 1 \text{ and } \beta_1(K_n) = \left\lceil \frac{n}{2} \right\rceil.$$

$$\beta_0 + \beta_1 = 1 + \left\lceil \frac{n}{2} \right\rceil \leq 1 + \frac{n}{2} \rightarrow (1)$$

$$p+q = n + \frac{n(n-1)}{2} = \frac{2n + n^2 - n}{2} = \frac{n(n+1)}{2}$$

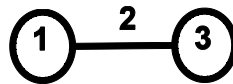
$$\left\lceil \frac{p+q}{2} \right\rceil = \left\lceil \frac{n(n+1)}{4} \right\rceil \rightarrow (2)$$

$$\left\lceil \frac{p+q}{2} \right\rceil - (\beta_0 + \beta_1) \geq \left\lceil \frac{n(n+1)}{4} \right\rceil - \left(1 + \frac{n}{2}\right) > 0 \text{ for } n \geq 3.$$

Therefore, for  $n \geq 3$ ,  $K_n$  is not highly total prime.

## 2.8 Note

$K_2$  is highly total prime.



### 2.9 Theorem

$K_{n,n}$  the complete bipartite graphs are not highly total prime for  $n > 2$ .

#### Proof:

Let  $K_{n,n}$  denote the complete bipartite graphs of size  $n$ .

Then  $p = n+n = 2n$ ,  $q = n \times n = n^2$

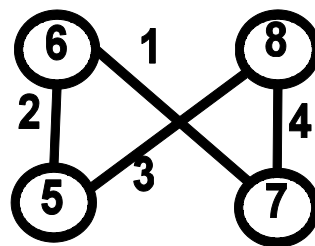
$$\beta_0(K_{n,n}) = n \text{ and } \beta_1(K_{n,n}) = n$$

$$\beta_0 + \beta_1 = 2n < \left\lfloor \frac{2n+n^2}{2} \right\rfloor = \left\lfloor \frac{p+q}{2} \right\rfloor \text{ for } n \geq 3.$$

Hence the result.

### 2.10 Note

$K_{2,2}$  is highly total prime.



### 2.11 Theorem:

Odd cycles are not highly total prime.

#### Proof:

Consider the cycle  $C_n$  with  $n = 2r+1$

$$p(C_n) = 2r+1, q(C_n) = 2r+1$$

$$\beta_0(C_n) = \left\lfloor \frac{2r+1}{2} \right\rfloor = r \text{ and } \beta_1(C_n) = \left\lfloor \frac{2r+1}{2} \right\rfloor = r$$

$$\beta_0 + \beta_1 = 2r, \frac{p+q}{2} = 2r+1$$

$$\text{Hence } \beta_0 + \beta_1 < \frac{p+q}{2}$$

So  $C_n$  is not highly total prime.

## 3. SOME FAMILIES OF HIGHLY TOTAL PRIME GRAPHS

### 3.1 Theorem

Paths are highly total prime.

#### Proof:

Let  $P_n$  denote path of length  $n$ .

Let  $V(P_n) = \{v_1, v_2, v_3, \dots, v_n\}$  and

$E(P_n) = \{v_1 v_2, v_2 v_3, \dots, v_{n-2} v_{n-1}, v_{n-1} v_n\}$

Define  $f(v_j) = j, 1 \leq j \leq n$

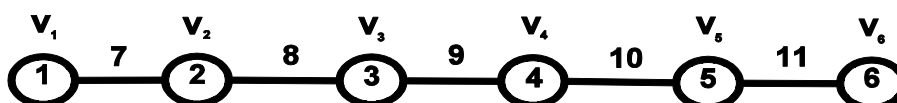
$f(v_i v_{i+1}) = n+i, \text{ for } i=1, 2, \dots, n$

Claim:  $f$  is a highly total prime labeling.

Adjacent vertices as well as adjacent edges receive consecutive numbers, which are relatively prime.

Therefore,  $f$  is a highly total prime labeling.

### 3.2 Illustration



### 3.3 Theorem

Even cycles admit highly total prime labeling.

**Proof:**

Let  $C_{2n}$  denote cycle of length  $2n$ .

Let  $V(C_{2n}) = \{v_1, v_2, v_3, \dots, v_{2n}\}$

$E(C_{2n}) = \{v_1 v_2, v_2 v_3, \dots, v_{2n-1} v_{2n}, v_{2n} v_1\}$

Define  $f(v_j) = j, \text{ for } j = 1, 2, \dots, n$

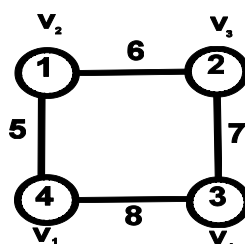
$f(v_i v_{i+1}) = i+4, \text{ for } i=1, 2, \dots, n-1$

$f(v_1 v_n) = n+1$

Adjacent edges receive consecutive numbers for  $i=1, 2, 3, \dots, n-1$  and  $(1, n) = 1$

Therefore,  $f$  is a highly total prime labeling.

### 3.4 Illustration

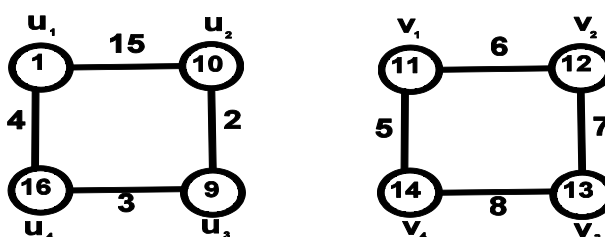


### 3.5 Theorem

Disjoint union of two even cycles  $C_{2n} \cup C_{2n}$  of same length are highly total prime.

**Proof:**

Case (i):  $n = 2$



Case(ii) :  $n \geq 3$

Consider  $C_{2n} \cup C_{2n}$ , the disjoint union of two even cycles of length  $2n$ .

Let  $V(C_{2n} \cup C_{2n}) = \{u_1, u_2, \dots, u_{2n-1}, u_{2n}, v_1, v_2, \dots, v_{2n}\}$

$E(C_{2n} \cup C_{2n}) = \{u_1 u_2, u_2 u_3, \dots, u_{2n-1} u_{2n}, u_{2n} u_1, v_1 v_2, v_2 v_3, \dots, v_{2n-1} v_{2n}, v_{2n} v_1\}$

Define  $f(u_i u_{i+1}) = i+6$ , for  $i=1, 2, \dots, 2n-1$

$f(u_i u_{i+1}) = 2n$ ,

$f(v_i v_{i+1}) = i+2n$ , for  $i=1, 2, \dots, 2n-1$

$f(v_1 v_{2n}) = 4n$

Adjacent edges receive consecutive numbers for  $i = 1, 2, \dots, 2n-1$  and  $(1, 2n) = 1$ .

In the second cycle adjacent edges receive consecutive numbers for  $i=1, 2, \dots, 2n-1$  except  $v_{2n} v_1$ .

Claim:  $(2n+1, 4n) = 1$

If possible, let  $(2n+1, 4n) = d > 1$ . Then  $d \geq 2$

Let  $2n+1 = k_1 d$ ,  $4n = k_2 d$

$2n+1$  is odd  $\Rightarrow k_1$  is odd and  $d$  is odd. Hence  $d \geq 3$

$4n$  is even,  $d$  is odd  $\Rightarrow k_2$  is even

$2n+1 = k_1 d \Rightarrow 2n = k_1 d - 1 \Rightarrow 4n = 2 k_1 d - 2 \Rightarrow k_2 d = 2 k_1 d - 2$

$\Rightarrow (2k_1 - k_2)d = 2$

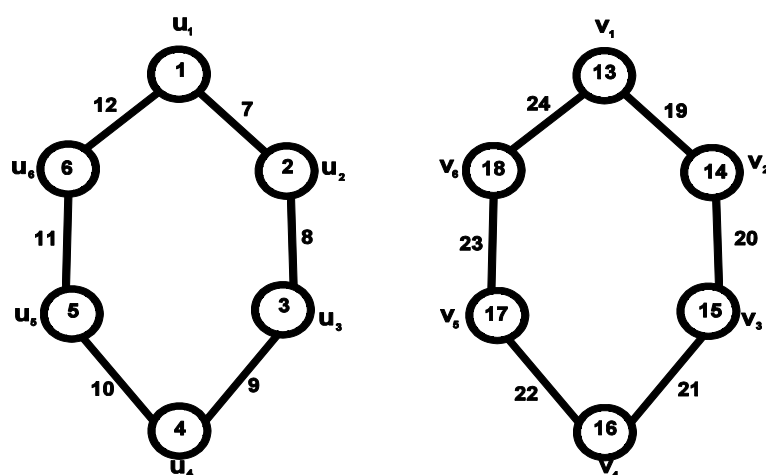
$d$  is not divisible by 2, since  $d$  is odd.

Therefore,  $2k_1 - k_2 = 1$  (or)  $2k_1 - k_2 = 2 \cdot d \neq 1 \Rightarrow 2k_1 - k_2 \neq 2$

$k_1$  is odd;  $k_2$  is even  $\Rightarrow 2k_1 - k_2 \neq 1$

Hence the claim.

### 3.6 Illustration



### 3.7 Theorem:

The corona graphs  $C_n \circ K_1$  are highly total prime when  $n \equiv 0 \pmod{3}$ .

**Proof:**

Let  $G$  be the corona graphs  $C_n \circ K_1$ .

$$V(G) = \{u_1, u_2, \dots, u_n, v_1, v_2, \dots, v_n\}$$

$$E(G) = \{u_1 u_2, u_2 u_3, \dots, u_{n-1} u_n, u_n u_1, u_1 v_1, \dots, u_n v_n\}$$

To define labeling  $f: V(G) \cup E(G) \rightarrow \{1, 2, \dots, p+q\}$  following cases are to be considered.

Case1:  $n \equiv 0 \pmod{3}$

$$f(u_j) = 2n+j, f(v_j) = 4n-j+1 \text{ for } j=1, 2, \dots, n$$

$$f(v_j) = 3n-2j, \text{ for } j=7, 8, \dots, n$$

$$f(u_i u_{i+1}) = 2i+1, \text{ for } i=1, 2, \dots, n$$

$$f(u_1 u_n) = 1$$

$$f(u_i v_i) = 2i, \text{ for } i=1, 2, \dots, n$$

$v_1, v_2, \dots, v_n$  are pendant vertices  $d(u_i) = 3, 1 \leq i \leq n$

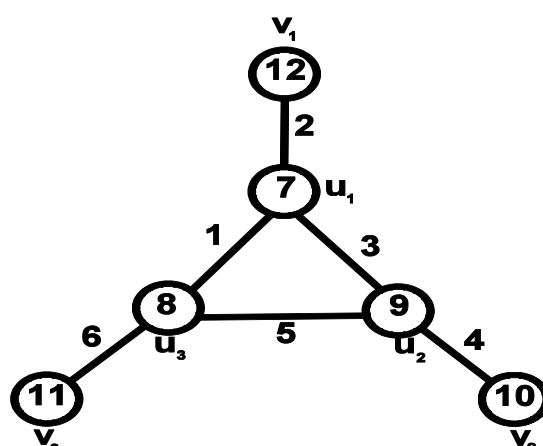
The three edges incident with  $u_i$  receives three consecutive integers.

Adjacent edges receive pairwise relatively prime labels.

we can easily verify that  $(2n+j, 4n-j+1) = 1$  and  $(3n, 2n+1) = 1$ .

Hence corona graphs  $C_n \circ K_1$  are highly total prime.

### 3.8 Illustration



### 3.8 Theorem:

Two cycles of same size with a common edge are highly total prime.

#### Proof:

Let  $G$  be the graph with

$$V(G) = \{v_1, v_2, \dots, v_{2n-2}\} \text{ and}$$

$$E(G) = \{v_i v_{i+1} / i=1, 2, \dots, 2n-1\} \cup \{v_{2n-2} v_1, v_n v_1\}$$

$$\text{Define } f(v_j) = 2n+j, 1 \leq j \leq 2n-3$$

$$f(v_1 v_{2n-2}) = 2n-1$$

$$f(v_1 v_n) = 1$$

Edges incident at  $v_n$  are labeled with  $1, n, n+1$ .

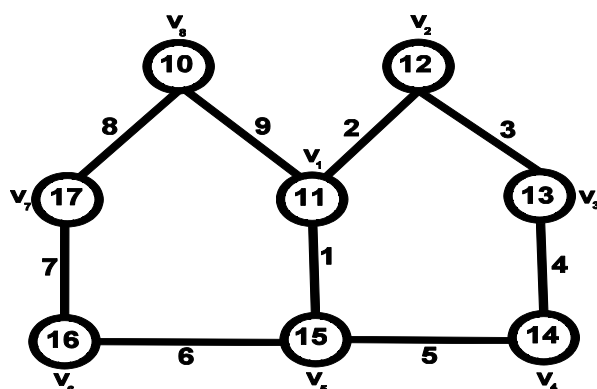
Edges incident at  $v_1$  are labeled with  $1, 2, \dots, 2n-1$ .

$$d(v_i) = 2 \text{ for } i \neq 1, n.$$

Two edges incident at any such vertex are labeled with consecutive integers.



### 3.9 Illustration



### 3.10 Definition [4]

Duplication of a vertex  $v$  of graph  $G$  produces a new graph  $G'$  by adding a new vertex  $v'$  such that  $N(v')=N(v)$ . In other words a vertex  $v'$  is said to be duplication of  $v$  if all the vertices which are adjacent to  $v$  in  $G$  are also adjacent to  $v'$  in  $G$

### 3.11 Theorem

The graph  $D(P_n)$  obtained by duplicating every vertex by a vertex in the path  $P_n$  is highly total prime only when  $n \leq 4$  where  $n$  is the number of vertices in  $P_n$ .

**Proof:**

Path  $P_n$  has  $n$  vertices and  $n-1$  edges

Let  $D(P_n)$  denote the graph obtained by duplicating every vertex in  $P_n$  by a vertex.  $D(P_n)$  has  $2n$  vertices and  $(n-1)+2+(n-2)2 = n-1+2+2n-4 = 3n-3$  edges

$\beta_0$  is the size of maximum independent set and  $\beta_1$  is the size of maximum matching.

In  $P_n$ ,  $\beta_0 = n$

Claim:  $\beta_1 = \begin{cases} n & \text{if } n \text{ is even} \\ n-1 & \text{if } n \text{ is odd} \end{cases}$

Proof for the Claim: when  $n=2k$ ,  $\beta_1 = 2 \leq 2 \left\lceil \frac{2k-1}{2} \right\rceil = \left\lceil k - \frac{1}{2} \right\rceil = 2k=n$ .

when  $n=2k+1$ ,  $\beta_1 = 2 \left\lceil \frac{n-1}{2} \right\rceil = 2 \left\lceil \frac{2k+1-1}{2} \right\rceil = 2 \left\lceil \frac{2k}{2} \right\rceil = 2k=n-1$

By theorem" If a connected graph  $G$  is highly total prime, then  $\beta_0 + \beta_1 \geq \left\lceil \frac{p+q}{2} \right\rceil$  where

$\beta_0$  is the point independence number of  $G$ ,  $\beta_1$  is the line independence number of  $G$ ,  $p$  is the number of vertices of  $G$  and  $q$  is the number of edges of  $G$ ."

Let  $n \geq 5$

For  $D(P_n)$ ,

$$p = 2n,$$

$$q = 3n-3$$

$$p+q = 5n-3$$

$$\left\lfloor \frac{p+q}{2} \right\rfloor = \left\lfloor \frac{5n-3}{2} \right\rfloor$$

$$= 2n + \left\lfloor \frac{n-3}{2} \right\rfloor$$

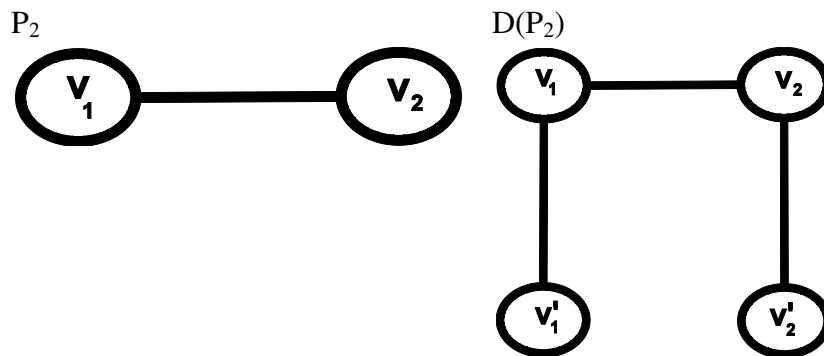
$$\geq 2n+1 \quad (\because n \geq 5)$$

$$\beta_0 + \beta_1 = \begin{cases} n+n & \text{if } n \text{ is even} \\ n+(n-1) & \text{if } n \text{ is odd} \end{cases}$$

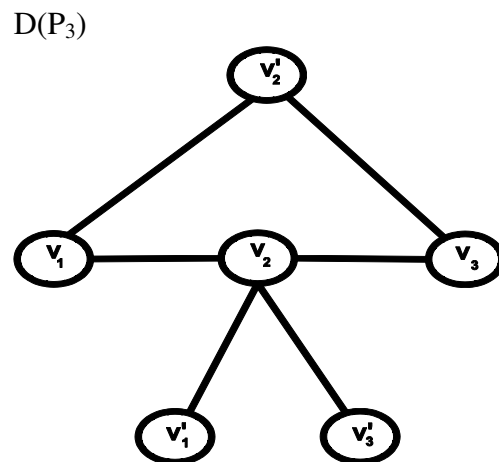
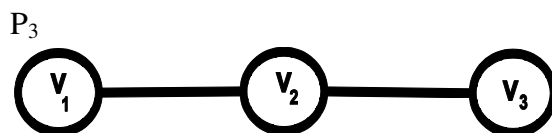
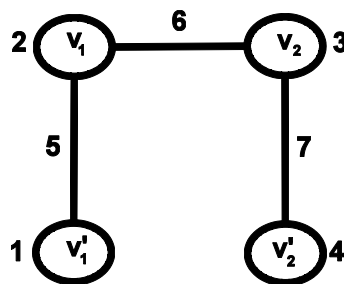
$$\beta_0 + \beta_1 \leq 2n < 2n+1 \leq \left\lfloor \frac{p+q}{2} \right\rfloor$$

Hence  $D(P_n)$  is not highly total prime when  $n \geq 5$ .

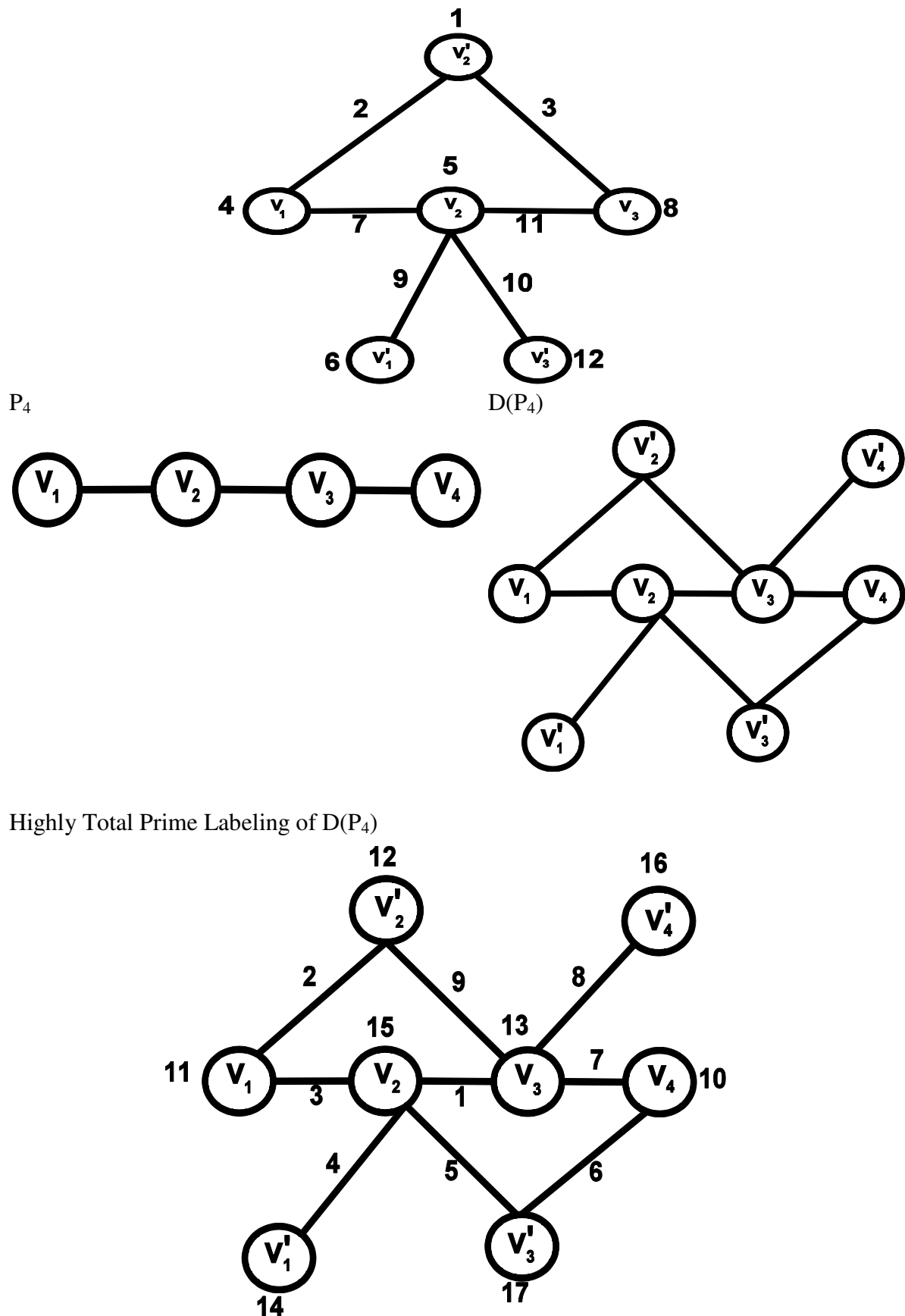
Highly total prime labeling of  $D(P_n)$  are given below



Highly Total Prime Labeling of  $D(P_2)$



Highly Total Prime Labeling of  $D(P_3)$



#### 4. CONCLUSION

In this paper we have discussed new type of graph labeling in detail. The discussion includes definition and results for highly total prime labeling techniques. Every highly total prime family of graphs gives rise to a prime family of graphs. Moving around in this area and mingling the different types of prime labeling cater to the need of researchers.

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